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Enhancing the Impact of Tours at an Open Innovation Environment

Master's Thesis

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Tiivistelmä

Organisaatioilla on usein tarve mainostaa itseään tehdäkseen brändistään tunnetumman joko oman organisaation tai kaikkien ihmisten keskuudessa. Organisaatiot voivat jakaa tietoa esimerkiksi toiminnastaan, tuotteistaan, palveluistaan, arvoistaan ja historiastaan. Jotkut organisaatiot tekevät tämän järjestämällä opastettuja kierroksia tiloissaan. Aalto-yliopiston Design Factory (ADF) on yksi tämänlaisista organisaatioista ja tämä työ tutkii mitkä tekijät vaikuttavat kierrosten onnistumiseen sekä miten positiivisesti vaikuttavia tekijöitä voidaan vahvistaa. Toimeksiannon tälle työlle teki CERN IdeaSquare.

ADF on avoimen innovaation tila, mikä toimii oppimis- ja yhteistyöympäristönä opiskelijoille ja tuotekehityksen ammattilaisille. ADF toimii myös Aalto-yliopiston näyteikkunana. ADF:llä järjestettyjen kierrosten tavoitteena on kertoa Aalto-yliopiston tarinaa, kertoa ADF:n saavutuksista, levittää ideoita ja kokemuksia projektilähtöisestä oppimisesta, yritysyhteistyöstä ja tulevaisuuden ammattilaisten koulutuksesta, sekä vaikuttaa Aalto-yliopiston kehitykseen sen päämäärien mukaisesti.

Tutkimus tässä työssä alkaa esittelemällä teorioita ihmisten oppimisesta näyttelyissä ja opastetuilla kierroksilla sekä miten esineet, tilat, toiset ihmiset, vierailija itse sekä kierroksen vetäjä vaikuttavat oppimiseen. Empiirinen tutkimus tehtiin haastattelemalla yhtätoista kierrosten vetäjää sekä tekemällä kysely viidelle vierailijaryhmälle jotka koostuivat yhteensä 55 vierailijasta. Aineisto analysoitiin temaattisen sisältöanalyysin avulla ja analyysin tulokset on jaettu kolmen pääteeman alle. Pääteemat koostuvat yhteensä 14 kategoriasta, joista jokainen vaikuttaa kierrosten onnistumiseen. Lisäksi, tutkimuksessa löydettiin keinoja, miten vahvistaa positiivisesti vaikuttavia tekijöitä.

Tulokset näyttävät, että sosiaalinen vuorovaikutus on avainasemassa kierrosten onnistumisessa. Sosiaalinen vuorovaikutus voi tapahtua vierailijoiden ja ADF:n yhteisön jäsenten, toisten vierailijoiden sekä kierrosoppaan välillä. Sosiaalista kanssakäyntiä ja muita onnistumiseen vaikuttavia tekijöitä voidaan edesauttaa esimerkiksi valmistelemalla kierros hyvin sekä antamalla kierrosoppaalle oikeanlaisia tarinankerronnan välineitä. Näitä välineitä ovat esimerkiksi tilat, esineet, prototyypit, toiset ihmiset sekä tieto.

Avainsanat vierailu, näyttely, opastettu kierros, avoimen innovaation tila, oppiminen, vierailijat, kierrosopas, Design Factory, epämuodollinen oppimisympäristö, näyttelysuunnittelu

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Abstract

Organizations often have a need to promote themselves to make their brand more known among general public and their own organization members. The organizations communicate information for example about their operations, products, services, values, and history. Some organizations do this by arranging guided tours in their premises. Aalto University Design Factory (ADF) is one of these organizations and this thesis aims to seek factors that affect the success of the tours, and how to promote the factors that have a positive effect. This thesis was assigned by IdeaSquare at CERN.

ADF is an open innovation environment that works as a learning and collaboration environment for students and product innovation professionals. Moreover, ADF works as a showcase for Aalto University. The aim of the tours of ADF is making the story of Aalto University visible; communicating the achievements of ADF; spreading ideas and experiences about problem based project learning, corporate collaboration and training of the experts of the future; and contribute to development of Aalto University according to the goals of Aalto University.

The research starts from introducing theories about how people learn at exhibitions and guided tours, and how objects, other people, the visitor, the tour guide, and the environment influence that. The empirical study is conducted by interviewing eleven tour guides of ADF and conducting questionnaires to five visitor groups. The data is analysed by inductive thematic content analysis and the end results of the analysis are divided into three main themes that include altogether 14 categories that affect the success of the tours. Moreover, hints about how to promote these factors are found.

The results show us that social interaction between the visitors and the ADF community members, other visitors and the tour guide, is important for a successful tour. Social interaction and other success factors can be promoted, for example, by preparing the visit well and by providing the tour guides proper tools for storytelling. These tools include spaces, objects, prototypes, other people, and knowledge, to mention a few.

Keywords Visit, visitors, guided tour, open innovation environment, learning, tour guide, Design Factory, informal learning environment, exhibition, exhibition design

FOREWORD

I would like to show gratitude to a bunch of people who have supported me during writing this thesis. I would like to thank Kalevi Ekman and Markus Nordberg who granted me this possibility to work with these two awesome organizations: Aalto Design Factory and CERN IdeaSquare. I would also like to thank Maria Clavert and Matti Hämäläinen for instructing me through this process. I believe it was a patience-demanding challenge to us all. Thanks to the whole ADF staff and community for the support and creating such an awesome environment for working. Special thanks to the people participating my interviews! Thanks also to my colleagues, support team and friends at CERN: Harri, Joona and Tuuli, and all the other CERN people I was working with.

In Helsinki, Finland, May 25th 2015

Justus Reinikainen

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COMMONLY USED TERMS AND ABBREVIATIONS

ADF	Aalto University Design Factory, an open innovation space in Aalto University, Finland
CERN	the European Organization for Nuclear Research
Corporate museum	an exhibition in a premises of a corporation, displaying for example products of the corporation
Corporation	an organization, usually a business, which has legally separate existence from the people who run it.
Exhibit	an object or artefact displayed at an exhibition
Exhibitions	Environments that display items: museums, retails spaces, art installations, science parks, trade shows, visitor centers, and corporate museums for example.
IdeaSquare	an open innovation space in CERN, Switzerland/France
Open innovation	a process where an organization exchanges knowledge, information and ideas by networking with other organizations and people that can represent suppliers, competitors, allies, and universities, for example.
Open innovation space	a space that facilitates open innovation
Tour guide	a person who guides visitor groups through spaces.

1 INTRODUCTION

Organizations often have a need to promote themselves to make their brand more popular among general public and their own organization members. The organizations communicate information for example about their operations, products, services, values, and history. By this they might aim to get more customers, users, partners, or employees. If they target their own organization members they might aim for increasing the employee loyalty. For some organizations, like non-profit organizations, the goal might be purely educational or informative.

There are various ways to do the promoting. Organizations can publish an advertisement in television, radio, a newspaper, bus stop, or web site, for example. They can make themselves visible in public straight in the eyes of people by offering free trial products, handing out leaflets, arranging competitions, arranging events and performing shows, for example. They can also promote themselves in social media. One way to do the promoting is to invite the audience to the premises of the organization to learn about the products, services, values, and history of the organization. This can be arranged by setting up an exhibition for example in to the entrance hall of the organization, and arranging organized or non-organized tours. This exhibition can show the actual products of the organization and reveal stories about the history of the organization, making the visitor learn about the values, goals, products and services of the organization. These kinds of exhibitions are called corporate exhibitions.

There exists relatively significant amount of studies about exhibitions. The research focuses often on how people learn at exhibitions and how the learning can be enhanced by for example different medias, social interaction, and different educational methods. Nevertheless, the research of corporate exhibitions has been widely neglected (Danilov 1991, Lehman & Byron 2007, Nissley & Casey 2002). There appears not to exist enough studies of what the

visitors are expected to learn at corporate exhibitions, how the visitors could learn that most efficiently, and how the corporations could monetize that, for example. Moreover, any studies proving the effectiveness of corporate exhibitions seem to be non-existent.

Aalto University Design Factory (ADF) is an open innovation environment, a collaborative product innovation space, a creative hub located in Espoo, Finland. The core activities of ADF are hosting student projects and other projects; nurturing collaboration; teaching; and supporting start-up companies, among other things. One of the key missions of ADF is to work as a showcase of the work of Aalto University, and one way to showcase the work done at ADF is to host tours to anyone who wants to learn about ADF.

The purpose of the tours of ADF is to educate visitors about the core activities of ADF – both externally to the general public and internally to staff and students. The ultimate mission of the tours is to make the story of Aalto University visible; communicating the achievements of ADF; spreading ideas and experiences about problem based project learning, corporate collaboration, and training of the experts of the future; and contribute to development of Aalto University according to the goals of Aalto University. The results of the tours are hard to measure, but it is expected that the visitors learn something. In addition, sometimes the tours lead to valuable relationships and meaningful collaboration. One example of such collaboration is IdeaSquare at CERN, which will be introduced later.

The purpose of this thesis is to unfold factors that affect the success of the tours at ADF, and how to promote the factors that affect the tour positively. Thus, the research questions are:

1) What are the factors that promote or inhibit the visitor tours of ADF reaching their goals?
2) How to enhance the factors that promote the visitor tours of ADF reaching their goals?

ADF has conducted thousands of visitor tours to make the general public and Aalto University students and staff learn about ADF. Since ADF is highly experienced when it comes to hosting visitor tours at an office and production environment, it is a fruitful environment to research how people learn at corporate exhibitions and similar environments. The comparison to corporate exhibitions is relevant, since ADF shares many needs with corporations when it comes to marketing: to educate people about the services, achievements, history, and values of it, for example.

This thesis brings more knowledge to the area of corporate exhibitions by researching learning of the visitors of an open innovation environment – a type of environment that seems to lack research of learning entirely. The primary need for this thesis came from another open innovation environment: IdeaSquare at CERN, which is a sister facility to ADF, completed in late 2014. IdeaSquare has similar need to ADF: it needs to educate general public about its activities, purpose, achievements, and history, for example.

This thesis works primarily as support for designing the visitor experience of IdeaSquare and Design Factory, but also other open innovation spaces can find this thesis useful. Furthermore, the findings can be helpful when designing for example corporate museums, other exhibitions, libraries, events, stores, public places or even websites – anything where visitors are expected to learn something.

This thesis first, in the chapter two, explores theories of what affects learning at guided tours. The chapter makes the reader familiar with most common aids for learning at exhibitions: interacting with exhibits, social interaction and storytelling among other things. The roles of five major factors that affect the learning during the tour are studied: the tour guide and the other organizers; the environment; the visitor; objects; and social interaction. The third chapter dives deeper into the context of the study: what is Aalto University Design Factory, why does it host tours, what do the tours include, and how IdeaSquare is related to this. The chapter four makes the reader

familiar with the empirical research methods and the results of the empirical research are presented in the chapter five. The findings from the literature review and the empirical research are combined and discussed in the chapter six. Moreover, suggestions for further studies and guidelines for designing visitor experiences in open innovation environments are provided.

2 Literature Review – What Affects Learning During Tours?

There exists many organizations that need to communicate the qualities of the organization, like values, history, products, and services, to the public and own organization members. This communication can happen outside or inside the corporation – either in a physical space or via specific media, for example TV or internet. When the communication happens in a physical environment, we can talk about communication environments, as the Figure 1 shows. Exhibitions are one example of these kinds of environments. They consist of the message that is intended to get communicated, and the built environment that works as the mediator for the message (Lorenc, et al. 2007).

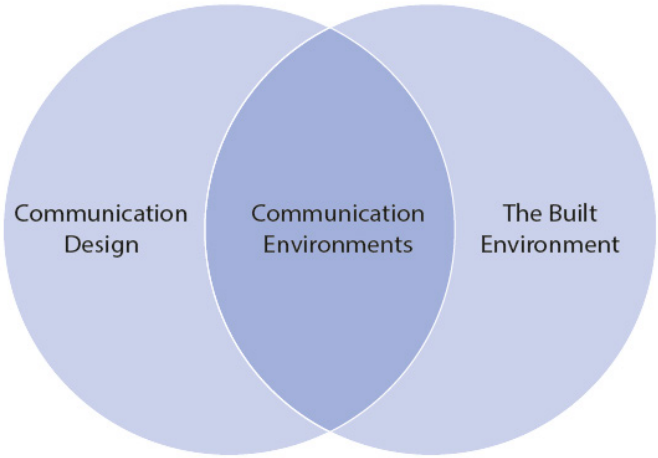

Figure 1: What communication environments consist of (Lorenc, et al., 2007)

Some corporations, or other organizations, that aim to have their messages through, establish exhibitions in their premises and invite the public and organization members to visit the environment to learn about the corporation. Exhibitions like this are often called corporate museums, or corporate exhibitions. These environments can consist of tangible objects, prototypes, products, written narration attached to each display, visuals, the verbal story told by a tour guide, and the socially constructed story created by the visitor and others, among other things, in a museum-like setting. The

aim of corporate exhibitions is to work as tools for public relations and marketing, communicating the history, operations, products, services and/or interests of a company to employees, visitors, customers, and/or the public. Moreover, they aim to work as repository of organization memory and as strategic assets influencing corporate actions (Bonti 2014, Danilov 1991, Nissley & Casey 2002). Corporate exhibitions are founded mainly for financial purposes of the exhibition: to make people aware of the company, hence getting new customers. In contrast, the purpose of traditional exhibitions is social and somewhat opposite to corporate exhibition: to make people aware of the content of the exhibitions to make individuals learn (Piatkowska 2014).

Corporations can be businesses, but it is not limited to that – the definition of corporation includes all organizations that have legally separate existence from the people who run it, although most commonly corporations are regarded as businesses (Cambridge University Press 2015.) Basing on that, in this thesis universities, open innovation environments and other organizational spaces where people produce anything, are handled as corporations.

Open innovation is regarded as a process where an organization exchanges knowledge, information and ideas by networking with other organizations and people, that can represent suppliers, competitors, allies, and universities, for example. Open innovation is used to accelerate the innovation process of an organization, and to find new uses for their innovation (Chesborough, et al. 2007, Enkel, et al. 2009, Gassmann & Enkel 2004). Some companies, like Philips have established open innovation environments to support the open innovation collaboration with different parties (Enkel, et al. 2009.) Aalto University established an open innovation environment called Design Factory in 2008 to host collaboration between students, companies, researchers, and start-up companies (Björklund, et al. 2011.)

This thesis dives deep into exhibitions at corporations, especially open innovation environments, since the research of the areas is widely neglected (Danilov 1991, Lehman & Byron 2007, Nissley & Casey 2002.)

When a visitor enters a corporate exhibition, the exhibition organizers expect the visitor to learn something for example about the history, operations, products, services and/or interests of the company, as already mentioned. Moreover, visitors go to exhibitions for social reasons, for entertainment reasons, and **to learn** (Hein 1998.) Since making the visitors learn is a goal of both the visitor and the organization, this thesis studies how people learn at exhibitions. Moreover, learning in corporate exhibitions and during guided tours is emphasized. The Figure 2 illustrates the relationship between all the research areas, the dark red part representing part of the research gap where this thesis focuses.

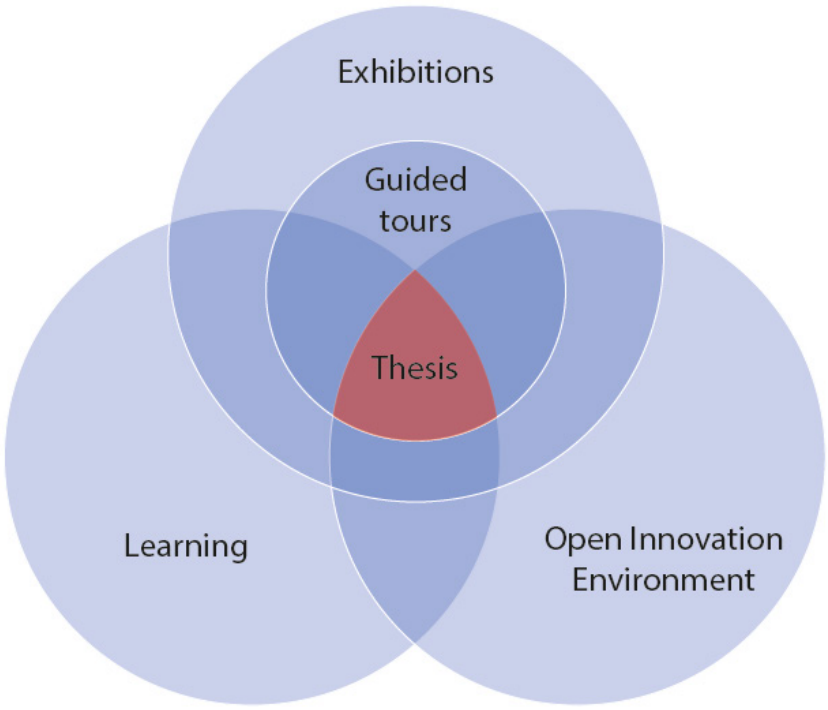

FIGURE 2: THE RELATIONSHIP BETWEEN FIELDS OF STUDY AND THE RESEARCH GAP

This literature review is divided into five elements that have an effect to the learning of the visitor, and that a typical tour at an exhibition consists of. The

elements are the tour guide and other organizers; the environment; the visitors; objects; and social interaction. The factors are discussed separately in different sub-chapters, backed up with research from relevant fields like learning, exhibition design, and informal learning environments.

To make sure that all the ways of learning are included in the literature review, a categorization of different ways of learning is used. The categorization (Figure 3) ranks the ways of learning by their retention rate – meaning the percentage of the taught matters that the person remembers. For example, according to the categorization, with discussion groups people remember 50% of the matters taught. While it is arguable whether one learning method is actually better than another, it seems that effective teaching uses all of the methods in different contexts (Lalley & Miller 2007). The Figure 3 shows which ways of learning are handled in each chapter. The illustration works as a guidance for readers to find the areas they are most interested in depending on the angle they look this thesis at. For example, some people might be more interested in learning styles, so the pyramid part helps them to find the relevant parts for their interested. Some people might be more interested for example in exhibition management. For them the right part of the illustration with chapter numbers and names shows the content of each chapter, and the connection to the pyramid shows briefly which ways of learning are handled in the chapter.

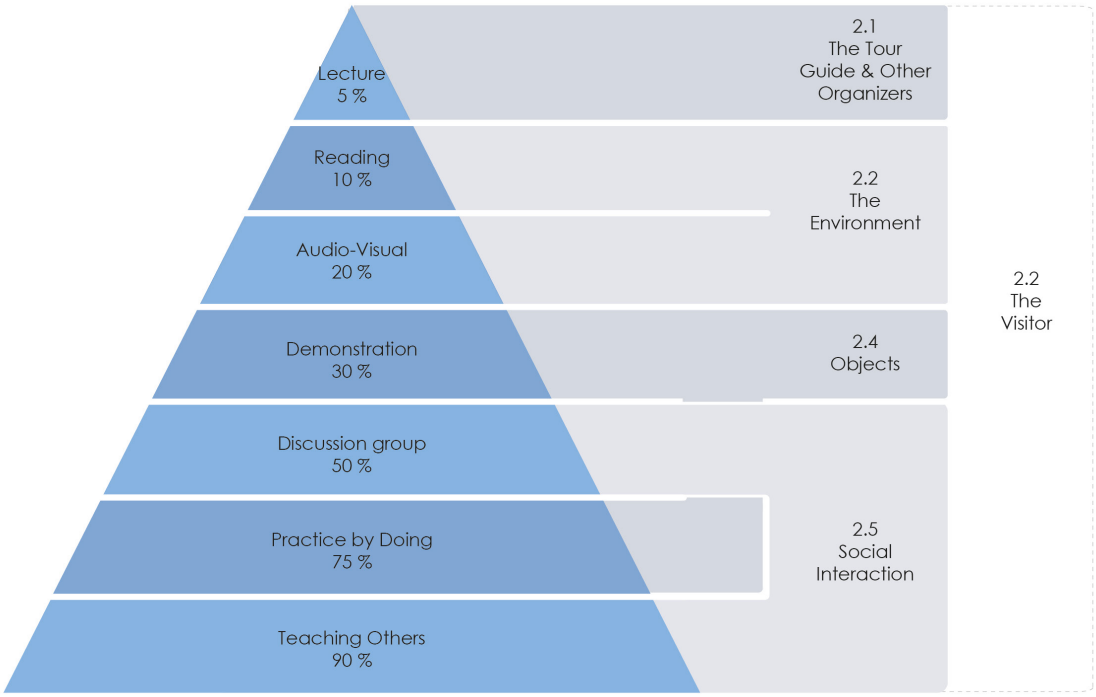

FIGURE 3: WAYS OF LEARNING AND THE CHAPTERS EXPLORING THEM, ADAPTED FROM LALLEY & MILLER 2007

2.1 TOUR GUIDE & OTHER ORGANIZERS

The role of the tour guide is essential during the tours of exhibitions, since exhibitions include lots of objects and environments that the visitors would not understand without having someone explaining them and answering questions. Moreover, it would be difficult for the visitors to know where to go and who to ask questions. Skillful tour guides are important for companies and institutions that arrange guided tours since the biggest reason for such a tour failing is not training the staff to communicate the organization culture (Locker 2011.) In addition to well-trained tour guides, well-motivated tour guides are needed to maximize the benefits of the training. Intrinsic motivations for the tour guides to host tours can be found, since interacting with visitors can be highly rewarding for the exhibition staff, too. It has been reported to educate the exhibition staff about how to run small-scale projects; to evaluate better; to think critically about the work of theirs and the exhibition; and how to improve their own practice (Hooper-Greenhill 1996.)

One of the important tasks of the tour guide is to convey stories – in other words "storytelling" - to the visitors. It is an important area of study since stories are widely used in education and can affect learning and communicating knowledge about organizations (Connelly & Clandinin 1990, Denning 2006.) This can be achieved for example by verbally telling the stories. Moreover, the visitor can bring he visitors to other people who can convey the stories, like the users of open innovation space. This can be effective for enhancing the branding of the space, since stories about brands are most effective when heard from the mouths of the customers (Denning 2006). This part of the thesis gives an introduction on how stories can be conveyed to the visitors. Usually the storytelling is done with the help of objects or spaces as tools for demonstrations, but verbal means are handled mostly in this part, since other parts of this chapter cover different storytelling tools like objects and spaces.

What stories consist of

All exhibitions have one thing in common: they all tell a story. The story can be a "truth", like a scientific fact, or it can be left to be interpreted by the visitor, with the help of objects and other exhibits. Nevertheless, all of the exhibitions are created by humans and since humans are fallible and culturally influenced, there is always space for unexpected interpretations and learning outcomes – which in many cases is good for the learning of the visitor. Exhibition making is not about displaying the truth, but facilitating interpretation and allowing visitors making their own meanings (Hein 1998, Roberts 1997).

The story is usually crafted from four different elements: a narrative, a narrator, a path, and a context. The exhibition design process begins usually by defining a message that needs to be conveyed to the audience. The message turns into a story only when it is given a **narrative** thread with a clear beginning, middle and end. A **narrator** is a factor driving the story forward: it can be for example text, graphics, objects or technology – usually more than

one of these. How they are used depends on the audience. For example families need information suitable for learning abilities of all age groups and specialist audience needs deeper information, supported by additional written material that can be accessed as a book or online. The **path** is what gives the story its structure, transforming the narrative into a three-dimensional space, which brings the story into life for each visitor. The path consists of sequence of experiences that can be arranged around a timeline, theme or hierarchy; any structure that has consistent logic. This sequence is usually provided in segments that build up the whole story. The segments are revealed often one by one, not allowing the visitor to see the entire structure at once. This a key factor in engaging the visitor. (Connelly & Clandinin 1990, Locker 2011, Lorenc, et al. 2007).

Helping people to understand the story

To help the audience to understand the conveyed message, it is important to help them interpret it in a right way. Making it easier for the visitors to interpret the message makes them surprised, inspired and curious to learn more. Interpreting an exhibition is most effective when the exhibition is provocative rather than instructional, encouraging audiences to ask questions about what they have learned. Stories about people and metaphors, for example, are efficient ways of helping interpretation since the audience can relate the information to their own experiences. For example, when talking about large masses, it is easier to understand and remember if it is measured, for example, in equivalent number of elephants. Especially when the conveyed information is hard to understand, this method can often lead to a "eureka" moment for the visitor. Through interpretation, abstract measures and ideas can be translated into something that the visitor can connect to and understand from their own life (Csíkszentmihály 1995, Locker 2011, Lorenc, et al. 2007, Pritchard 2009).

Stories about the people who work in the industry enable visitors to make human connections to difficult technical issues. Believable, though sometimes

hypothetical, characters and situations can be used to make the audience feel familiar with the story – which is especially effective when an organization wants to communicate its values by storytelling. It is important for a learner to be able to associate an educational situation with what is already known, since prior knowledge determines how a learner handles new information. A research shows that learning proceeds primarily from prior knowledge and only secondarily from the presented materials. Therefore when designing exhibitions it is essential to understand what the visitor already knows and does not know (Csíkszentmihály 1995, Denning 2006, Locker 2011, Roschelle 1995).

It is generally a good practice to add a sense of humility and humor to the exhibition by not only showing success stories but also showing failures, since drama like this engages audiences and makes them feel related to the story. This is especially effective storytelling method when an organization wants to communicate who they are (Denning, 2006, Locker, 2011, Lorenc, et al. 2007).

As a conclusion: a good structure for designing attractive exhibitions is PROVOKE, RELATE AND REVEAL. (Locker 2011)

Preparing the visitors

Exhibition organizers preparing the visitors for the visit – or the visitors preparing themselves – has a great affect to the learning of the visitors. Telling visitors beforehand what they might learn or experience, what they might find out or what the intention of the exhibition helps making visitors reach "Flow state" – a state where a person is perfectly concentrated on what they do (Csíkszentmihály 1995). Preparing the visitors makes them more comfortable and more able to engage with the exhibitions, thus being better able to learn. Moreover, visitors planning themselves what to see, where to focus, and thinking why something is important makes them more able to learn (Screven, 1986). Exhibition staff giving instructions such as "think

yourself as a geologist" before the arrival of the visitors has provided positive effects on learning. Researchers have speculated that providing visitors with list of key concepts or unifying generalizations may prompt prior knowledge and increase interest and learning from an exhibit (Koran & Koran, 1996).

Preparing the visit to last long enough for meaningful learning is a simple way to enhance learning, too (Hein, 1998).

2.2 The Environment

As discussed before, one of the key areas of this research is learning of visitors in an open innovation environment. This chapter explores special characteristics of learning in informal learning environments – mainly different types of exhibitions, like corporate exhibitions - and how the design of the environment can affect learning.

It is worth noticing that learning at exhibitions differs from learning at a normal classroom setting, even though the basic mechanics of learning might be similar in both environments. Below informal learning is defined as learning that happens outside academic curricula. It is to be noticed that informal learning can happen inside an academic institution as long as it happens outside of academic curricula (Livingstone 2001).

> "Informal learning is any activity involving the pursuit of understanding, knowledge or skill which occurs without the presence of externally imposed curricular criteria. Informal learning may occur in any context outside the pre-established curricula of educative institutions. The basic terms of informal learning (e.g. objectives, content, means and processes of acquisition, duration, evaluation of outcomes, applications) are determined by the individuals and groups that choose to engage in it. Self-directed or collective informal learning is undertaken on our own. Informal education or training is distinguished from

such self-directed informal learning only by the presence of some form of institutionally-recognized instructor." (Livingstone 2001).

Examples of informal learning environments are family discussions at home; visits to museums, nature centres, or other designed settings; and everyday activities like gardening, as well as recreational activities like hiking and fishing, and participation in clubs (Bell, et al., 2009).

Informal learning environments can enhance the learning results by providing appropriate ways of learning for different people and motivating the learner, thus increasing the amount of learning. Informal learning environments, like exhibitions, tend to include elements that encourage the visitors to hands-on doing and doing things together, which often support learning (Hofstein & Rosenfield 1996). The oncoming parts of this literature review will handle those aspects more deeply.

Exhibitions and corporate exhibitions

As this thesis inspects how people learn at exhibitions at open innovation environments, it is worthwhile to get to know what exhibitions actually are. Exhibitions are environments that communicate – a mix of careful design of what to communicate and how to show it, as Figure 1 illustrates it. Exhibitions always aim to convey a message. The message can be a historical story, a presentation of an organization or collection of scientific facts for example. The message is often conveyed by creating experiences in real time, utilizing space, movement and memory to facilitate multilayered communication. Exhibitions often consist of object displays and audio-visual displays. (Locker 2011, Lorenc, et al. 2007). Different ways to convey messages are analyzed more deeply later in this chapter.

Exhibitions can be museums, retails spaces, art installations, science parks, trade shows and visitor centers, and corporate museums for example. Corporate museums are exhibitions that are usually associated with a

commercial company or other organization and are usually located at a production centers or corporate headquarters. They aim to communicate the values, mission, goals, products, services, operations, interests and/or philosophy of the organization, thus building brand loyalty. Effective exhibitions tell stories of an organization: the lives achievements of their founders, how the organization overcame adversity, its contributions to public good, and where the organization is headed in the future, for example. Corporate exhibitions can aim to reach a specific user group like potential clients, but can also aim to reach wider audience like the general public. In addition, corporate museums can aim to reach own employees of a company. These kinds of centers aim to answer questions like "Who are we?", "What do we stand for?" and "What makes us different?" communicating the values and building commitment among the employees and for example potential clients (Lorenc, et al. 2007, Nissley & Casey 2002).

Spatial design affecting learning

The design of the exhibition space has a great influence in the learning of the visitors, helping them to better focus on making meaning at the exhibition. This can be achieved through for example comfort of the visitor and accessibility of exhibits. These matters can be enhanced for example by designing how the lighting is set, colors of the walls, noise control, how the traffic of the visitor masses are managed and how high the objects are placed (Hein 1998, Olds, 1990). The exhibition spaces should be designed to be modified easily, since organizations and exhibition themes often change. The use of multimedia and computer technology helps in this (Lorenc, et al., 2007).

The layout design is important for traffic management inside the exhibition. Moreover, people need to have freedom of movement to have their needs met and to know where they are. Knowing their location in the exhibition, the location of their group, where all the services are, are major factors affecting the comfort of the visitors. When the visitors feel comfortable, they are more able to learn. These factors can be met by for example orientation aids: maps,

signs, color codes, distinctive graphics and ideograms and most importantly: skillful staff who can guide the visitors (Hein, 1998).

The object placement needs to be carefully designed since for example the visitors tend not to visit both of the objects that are placed to face each other. They neither do not enjoy standing their back to an open space since it is not natural activity for humans (Olds, 1990) (Hein, 1998).

The comfort of the visitors can be enhanced by placing chairs, benches and other places to rest at the exhibition. This can have multiple advantages: it is proven that placing benches at exhibits will lengthen the time spent at the exhibit, which enhances learning results (Hein 1998) and by placing benches for two, people will interact with each other, thus learn more (Feher 1990.) Moreover, comfort can enhance learning results: according to neurolearning researches, classrooms that provide a safe and stimulating environment, are likely to lead to better learning outcomes (Pritchard, 2009.)

Text labels at the environment

Different methods are used in conveying the stories to the audience: text, sound, speech, graphics, objects, interactive elements and videos for example. Often it is argued that the visitors almost never read texts at the exhibitions, but a study argues that people are much better at reading quickly on the move and from a distance at exhibitions than is often assumed (McManus, 1989). Many studies demonstrate that adding text labels increase the time spent at exhibit objects and the percentage of people looking or interacting with the object (Hein, 1998). For example, an exhibit where the temperature difference of two different metal plates was demonstrated was examined: the percentage of people testing the difference by touching the metal plates increased from 6 to 78 percent when a label was added to the exhibit. The same study shows that visitors read an average of only 18 percent of the labels in an exhibition, but they do read 68 percent of the labels at the exhibits they chose to spend longer time at. Moreover, the visitors regarded the labels and other printed

material important, because the material allows the visitors to learn more about the exhibits they are interested in (Borun & Miller 1980). In another study, visitor time as well as knowledge gain was doubled for first-time visitors by adding labels, pictures and sound to exhibits (Peart 1984.)

2.3 The Visitor

An important contributor on how much the visitor learns during the tour is the visitor itself. All of the visitors have different learning styles and for exhibition managers, tours guides and other people related to hosting visitor groups it is important to recognize them so that maximum learning outcomes can be achieved by designing the exhibition to cater the needs of different visitors.

Various different researches, for example Honey & Mumford 1982, Kolb 1984 and Serrell 1996, during past decades have identified four different types of people who each have different ways of learning in museums. These four types are discussed below. Moreover, types of exhibitions suitable for these types are suggested according to two different researches: Hein 1998 and Monti & Keene 2013.

Analytical learners assimilate by thinking and observing. They favour interpretation that offers facts and sequential ideas, and want sound logical theories that allow for consideration and intellectual comparison. The characteristics of exhibitions suitable for analytical learners are: objects are systematically arranged in displays; interpretation is mainly facts and sequential ideas; no allowance for personal interpretation; the exhibits consist mostly of objects, lecture and text; specialist language used; logical theories invite comparison and thinking; and topics progress from simple to complex

Common-sense learners learn by thinking and doing. They prefer first person experience, trying out theories and testing them for themselves. The

exhibitions suitable for common-sense learners have exhibits designed to motivate viewers; include interpretation that gives a linear set of goals; encourages to interaction of individuals; encourages to physical interaction, like pressing buttons; provides positive and negative feedback from actions; helps the learner to acquire knowledge piece by piece; and avoids excess interaction to avoid distraction.

Experiential learners assimilate by doing and feeling. They enjoy imaginative trial and error, and prefer hands-on experiences while searching for meanings. The exhibitions supporting this learning type consists of exhibits that lead to gradual understanding of the narratives of the museum; encourages the visitor to have an active role; consists of exhibits that are highly interactive with clear feedback and highlights hands-on experiences to promote first-person discovery.

Imaginative learners regard feeling and watching, listening and sharing ideas essential; they prefer interpretation that encourages social interaction while they search for personal meaning. Common characteristics exhibitions suitable best for this learning type are exhibits that are not presented in linear, predetermined sequence; exhibits that offer different entry points; information offered via various medias using more than one sense; they encourage to social interaction; they encourage to listening and sharing ideas in the search of meaning; and they use familiar concepts and objects so that visitors can make connections with them.

In addition to different ways of learning, different people have different types of intellectual capabilities. A study has categorized the intelligences to nine types: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, naturalistic and existential (Gardner 1997.) Another study has created recommendations how to serve these types of intelligences at exhibitions to maximize the leaning results of different kinds of people. For logical mathematical people it is recommended to use numbers, classification, critical thinking, and calculations in the exhibits. For people

with spatial intelligence, it is recommended to include into the exhibition pictures, diagrams, colors, art, graphs, and possibilities to create visualizations. Some people have stronger intrapersonal capabilities and some people have stronger interpersonal capabilities. For intrapersonal people it is recommended to arrange a chance for private learning time, while for interpersonal people it is recommended to arrange chances for group work, peer sharing, and discussions. For people with bodily-kinesthetic intelligences it is beneficial for learning to include movement; devices; drama; interacting with objects and space; and doing things by hand. People with musical intelligences learn best by listening and they can benefit from music, sounds, rhyme, rhythms, and dance included in the exhibitions. Verbal learners learn best when there is reading, writing, and speaking included in the exhibition. Naturalistic learners learn best outdoors, relating previously acquired knowledge to the natural world (Pritchard 2009).

2.4 Objects

The tours of corporate exhibitions often include displays and demonstrations of objects, like products and prototypes built by the corporation (Bonti 2014. Nissley & Casey 2002.) This chapter introduces how objects can affect learning at exhibitions.

Giving visitors an opportunity to tangibly experience the brand is a good practice for succeeding in brand communication. For example, this could be a distillery or brewery visitor center where the visitors could create their own mix of a drink (Locker 2011.) One reason for this is that visitors often view interactive experiences as best ways to learn. Moreover, giving visitor a possibility to interact with the exhibition makes the visitor more attracted to the exhibition (Falk, et al. 2004).

There are approaches that claim that learning is an active process and is often connected with physical activity associated with learning, thus the common term “hands-on learning” (Hein 1998.) Nevertheless, the physical interaction

with the world does not guarantee learning. When done right, it stimulates a person to mental activeness – to think – which often, but not always, leads to learning. This is why "minds-on learning" is often emphasized instead of "hands-on learning" (Cremin 1961, Duckworth 1990). The previous chapter introduced what kind of thinking would be beneficial to be stimulated for different people.

Physical interaction with objects provides various other advantages too. Interactive experiences on exhibitions promote talking, communication and doing things together, which are all regarded to promote learning. These matters are covered in the chapter 2.5. (Falk, et al. 2004, Heath, et al. 2005). In addition, objects provide chances for alternative interpretation – making the visitors reflect the object to their own experiences of similar objects, giving the visitor an opportunity to apply content knowledge to everyday life (Macdonald 2007, Falk, et al. 2004).

Now we know that objects and interaction with them can promote learning by motivating the visitor, stimulating their intelligence, promoting social interaction, and providing opportunities for reflection and familiarization. In addition to that, it is important to know what the visitors will actually learn better with the help of objects. A study has categorized learning by interacting with exhibit objects into eight dimensions that occur often on interactive exhibitions. The dimensions indicate what types of learning has occurred during the experience: gaining knowledge, learning new skills, getting new interests, adopting new values, learning museum literacy, social learning, creativity and awareness, which are not independent of one another. The learning dimensions have been categorized into four semi-independent categories, or learning outcomes: knowledge and skills; perspective and awareness; motivations and interests (willingness to find more information or to start action); and social learning (learning from others). Most commonly learning results from interacting with the exhibit fall to more than one of the categories. These findings indicate that interactivity can support the learning

and/or reinforcement of facts and concepts. According to a research, interactivity supports most short-term learning in knowledge and skills, while for long term learning (measured months after visit), interactivity supports most the perspective and awareness of the visitors. (Falk, et al. 2004)

Using intelligence and senses

As mentioned before, physical interaction with objects makes people think. Physical interaction, a task, an intellectual challenge, or an activity can help a person reach a "flow state" - a mental state of full involvement, of complete immersion in a task or an activity, which often enhances learning results (Csíkszentmihály 1995, Hein 1998).

When designing exhibits, it is valuable to know what kind of thinking is expected from the visitor, since different activities stimulate different areas of intelligence. Moreover, all of the people are stronger in certain areas of intelligences and weaker in other areas.

Multiple intelligence theory suggests that people have nine types of intelligences: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, naturalistic and existential. All these types should be activated in educational experiences or programs since this will lead to applying more senses in the learning and people get to use their strongest areas of intelligence (Gardner, 1997). The intelligences are discussed in more detail in the chapter 2.3

In addition to intelligence, other important brain capability for learning is senses, which are naturally used when interacting with objects and environment. Studies have shown that the more senses people use during learning process, the better they learn (Shams & Seitz 2008, Csíkszentmihály 1995.) Encouraging visitors to use senses such as sound, smell, and touch, in comparison to using only vision, can enrich the learning and increase the visit time, which also enhances learning (Davidson 1991.)

How much of objects is enough?

It is important not to overwhelm the visitor with loads of new information, but to keep amount of exhibition objects and new information low enough so that the experience does not exceed their adaptive capabilities (Olds 1990.) Moreover, it has been shown that people spend longer time and engage more deeply with exhibits when there is limited amount of objects shown (Hein 1998, Mazda 2006.) There needs to be a balance with the amount of information provided: there should not be too much or too little interpretation left to the visitor. Levels of interpretation has been divided in to three categories: under-interpretive, misinterpretive, and interpretive. Under-interpretive exhibits consist of too little written information or too few objects, or cause an intellectual overload by providing too much of them. Misinterpretive exhibits cause sensory over-stimulation and lack of learning by for example having too many objects and visual presentations (Wittlin 1971).

2.5 Social Interaction

The tours at corporate exhibitions, and exhibitions in general, are often arranged for groups of people instead of people going to the exhibition alone. In addition, depending on the exhibition, it is often possible to meet other visitors from other groups and staff members or other members of the hosting organization. Social interaction with these people – both strangers and companions - is a critical part of exhibitions by shaping and influencing the visitor experience thus enhancing the learning of the people. Baldwin, et al. have formulated it well:

> "Adults often learn most efficiently in groups that they join by choice, groups characterized by discussion, interaction, and collaboration and in which participants both receive and provide academic and social support. Such groups value the individual;

at the same time they require that the learner communicate and reflect within the group." (Baldwin, et al. 1990)

The interaction can occur in many verbal (e.g. talking) and non-verbal (e.g. observing how others interact with exhibits) ways. In exhibition design, it is important to recognize different possible forms of social interaction and it is important to design the exhibition so that variable and highly contingent forms of social interaction will occur. (Hindmarsh, et al. 2005, Vygotsky 1978.)

Many studies have proven that working together, in formal classroom setting or in an exhibition, people learn more and better by working in pairs or groups, compared to working alone. This is due to the information exchange that happens between the learners (Matusov & Rogoff 1995, Uzzell 1993). Though, social interaction is not always regarded as a way of transferring knowledge between visitors, but as a way of creating circumstances for people to experience the exhibition together and in different ways. Each visitor brings their own unique experiences, interests, culture, prior knowledge, and preferred learning styles to the exhibition. By interacting with other people at the exhibition, building on the ideas of each other, and sharing experiences the visitors shape their collective experience to an unpredictable direction – often different than the exhibition designers intended – which can enrich the experiences of the visitors, thus leading to unexpected and fruitful learning outcomes. (Hein 1998)

Experiencing exhibitions together can enhance the learning in a far-reaching way for visitors who share lots of values, knowledge, and experiences between each other. For example families can visit museums and instead of sharing their thoughts right away at the exhibition, they can also store the knowledge for later sharing between the family members, thus shaping the learning experiences of each other in more far-reaching way. Analogy of "potential learning" can be used with this phenomenon, comparable to potential energy (Borun & Chambers 1996).

How to enhance social interaction

An example of an exhibit diminishing social interaction could be an exhibit in which the visitor is expected to, for example, go through a series of tasks alone in order to trigger an effect. In contrast, to enhance social interaction it is encouraged to design the exhibits so that more than one visitor can explore them at once and anyone can join the exploration any time of the visit (Hindmarsh, et al. 2005). There are various examples of these kinds of exhibits and their efficiency in teaching. For example an exhibition designer installed various interactive exhibits that encourage to interaction between people. One of these was an interactive movie with alternating storylines where the exhibition visitors could vote how the story proceeds. This and other similar exhibits made visitor groups have rich conversations after the exhibition (Hein, 1998).

Technology mediating the interaction

Making exhibition objects interactive, for example by using technology, can facilitate social interaction but it can also reduce it, which might work against the purpose of the exhibition. Reasons for technology reducing social interaction can be too small screens or clumsy interfaces among many other things. Therefore the exhibition designers need to be careful with using technology. Nevertheless, even though using technology such as own mobile phones as parts of exhibitions would seem to limit interaction between people, there are studies that show how such technologies can open up totally new ways of sociality in the exhibition (Heath, et al. 2005, Macdonald 2007). Technology-based interpretation is an important tool for meeting the needs of the visitors – especially when there is a need for meeting visitors from a specific segment. The advantages of using technology get further emphasized when the visitors are from the generation Y – people who have born between early 80's and late 90's and grown with technology around them. These people tend to share their experiences and after-visit opinions via for example mobile phones with others in social media and the website of the organization.

Therefore it is important for exhibition designers to use (mobile) technology as a two-way communication channel: to deliver messages to the visitors to be interpreted and to allow visitors to share their experiences with other potential visitors and the exhibition staff (Leask, et al. 2014, Carter 2006).

2.6 Summary and Research Questions

This chapter reviewed how people learn at informal learning environments, and more specifically, at exhibitions.

First the role of the tour guide was handled. The tour guide is the storyteller and to make the visitors understand what he or she is talking about, the tour guide needs to provoke and prepare the visitors to think and ask questions and to relate the stories to the own lives of the visitors.

Second, the role of the informal learning environments and exhibitions as learning spaces was reviewed. Moreover, the design of the space affecting learning was discussed: the lighting, text labels, noises and layout all affect learning.

The visitors themselves have a great effect on their own learning, since different people have different learning styles and different areas of intelligences they are strong at. The tour designers need to recognize these learning styles and differences to reach as many people as possible. They were presented in the third part of this chapter.

The fourth part explores how objects can promote learning by for example motivating the visitor, stimulating their intelligence, promoting social interaction, and providing opportunities for reflection and familiarization. Moreover, what the visitors will actually learn with the help of the objects were introduced.

The fifth part studies the role of the other people in learning. The visitors are accompanied by other visitors on most of the tours, and it is important to recognize that other people shape the learning experience greatly by allowing exchange of knowledge and experiences, and by creating unique

circumstances for learning. In addition, technology as a mediator for social interaction was reviewed.

Now knowing what factors affect learning at exhibitions, it might be useful to remind about the research questions of this thesis:

1) What are the factors that promote or inhibit the visitor tours of Aalto University Design Factory (ADF) reaching their goals?
2) How to enhance the factors that promote the visitor tours of ADF reaching their goals?

The next chapter will explain what ADF is, what it is aiming to achieve by hosting tours to visitors, and what the visitors are expected to learn.

3 Context of the Study

The previous chapter reviewed the roles of the tour guide, the organizers, the environment, objects and other people in the learning of exhibition visitors.

To understand why this thesis is done, this chapter will provide understanding of what is Aalto University Design Factory, what is it aiming to achieve by hosting tours to visitors and what the visitors are expected to learn. Furthermore, an overall picture of typical tours of ADF, typical profiles of visitors, and typical experiences during the tours are given. Finally, IdeaSuare at CERN is briefly introduced.

The content of this chapter bases on the own experience of the author of this thesis backed up with research conducted at ADF. The experience of the author consists of five years of ADF community membership, including three years of employment by ADF and dozens of visitor tours guided.

3.1 What is Design Factory

Aalto University Design Factory (ADF) is a project of Aalto University started in 2008. It is a 3000 square meter large working environment enabling creative work, hands-on working, sharing knowledge, interaction, and experience exchange. It is an experimental platform for education, research and application of product design, bringing together students, teachers, researchers and practitioners across different disciplines. ADF aims to develop and promote passion-based student-centric learning culture for Aalto University. Moreover, it aims to develop creative ways of working, spatial solutions, and enhanced interdisciplinary interaction to support world-class product design in educational research and practical application contexts.

ADF aims to achieve these goals by providing flexible and modifiable multi-purpose spaces for students, researchers, teachers and companies. These spaces include metal, plastics, wood and electronics workshops; a café; office

spaces; meeting rooms, and lecture halls – usually one space representing more than one of these types due to their multifunctional nature. The spaces are built to support individual working, teamwork, lectures, events, workshops, team building, and prototyping.

In addition to spaces, ADF hosts community, which is a great part of the identity of ADF. The community consists of researchers, students, teachers and company representatives, for example. The community members guide each other in their work, either because they get paid for it or purely for the sake of helping.

ADF community members were asked to write words that describe ADF. One of the most common words were: meeting point, community, inspiring, fun, future, mindset, home, learning, curiosity, hands-on approach, open, awesome, continuously developing and low hierarchy. The list gives an idea what kind of an environment we are dealing with in this thesis. Most of the listed features belong to the core cultural features typical to ADF, according to a research conducted at ADF (Oinonen 2013).

Typical activities of ADF are for example university student projects related to innovation; university courses; collaboration between students and companies; private working; workshops; research related to innovation; lectures; seminars; and events related to innovation or other activities of Aalto University.

(Björklund, et al. 2011, Tuulos & Solovjew,2013)

For a detailed story of different activities and spaces of ADF, see the Appendix 4: A day at ADF.

3.2 Tours of Design Factory

ADF is active in hosting tours: in the academic year 2012-2013 ADF staff hosted 4100 individual visitors (Tuulos & Solovjew 2013). The purpose of the tours of ADF is to educate visitors about the core activities and culture of ADF – both externally to the general public and internally to staff and students.

The ultimate mission of the tours is to make the story of Aalto University visible; communicating the achievements of ADF; spreading ideas and experiences about problem based project learning, corporate collaboration and training of the experts of the future; and contribute to development of Aalto University according to the goals of Aalto University.

The tour guides can be ADF community members or they can come from outside of the community. Most commonly the tour guide is anyone from the staff, and the tour guiding responsibilities are pursued to be divided evenly to people who have enough of flexibility in their work, like people how do office work. In addition to the staff, other community members can give tours, but it is not as common as staff members guiding tours.

The tour guides do not necessarily have to be ADF community members: members of other departments of Aalto University, for example, often bring their guests to ADF. Some of them know the spaces and the people so well that they can host the tours, which is advantageous to all the parties.

The tours usually last an hour and they include spoken lectures by the tour guide, talking with community members, demonstrations of prototypes and products built at ADF and seeing different spaces. Visitors come to Design Factory in groups varying from one to over hundred people. In case of larger groups, the visitor groups are divided into smaller groups, aiming to group size of approximately 20 people or less. Typically visitor group members belong to the same organization with each other. This organization is usually a company, university or other institution outside Aalto University; a department inside Aalto University; a student group or class of Aalto University; or other school group from higher and lower education.

The projects conducted at ADF tend to have usually some kind of a practical outcome, like a prototype or a product. Sometimes these outcomes, or parts of them, are left to Design Factory as memoirs of past projects. Through the years a wide variety of different objects have found their places from ADF as

exhibit objects that the students and the visitors can admire. Other objects, that the visitors usually get introduced to, are for example production machines, coffee machines, unique furniture, and public displays with constant live video connection to other locations. If lucky, the visitors get introduced to less permanent objects, like prototypes that students are working with – sometimes the visitors can even get to test the prototypes. A very popular attraction during the tours is "Hugging Points", shown in the Figure 4. They are marked spots where people are supposed to share hugs with each other. It is a playful way to enhance the team spirit and happiness of the community. It is usually introduced to the visitors since it is assumed that it works well as a demonstration of the importance of a close community.

FIGURE 4: A STICKER AT ADF INDICATING THE SPOT FOR THE HUGGING POINT

3.3 SPACES OF DESIGN FACTORY

Spaces play a major role on the tours of ADF. The tour usually starts from the entrance hall in the first floor and proceeds through most of the spaces in

the first floor and the basement. The second floor is usually visited if there is enough of time remaining. The tour guide walks the visitor group through the spaces, stopping every now and then to explain about the purpose of the space. Sometimes in the space there are staff members, students, or other community members who the tour guide can ask to explain about their work to the visitors.

Figure 5 illustrates the spaces of ADF. The spaces are colour coded into three categories basing on the purpose of the space. First category represents spaces that can be reserved and used for lectures, workshops and meetings. These are usually multifunctional lecture rooms or rooms for group meetings. It is common for student groups and other groups of the community to hold team meetings, idea development sessions, and workshops in these spaces. Moreover, the teaching staff uses these premises for lectures unless the space is too small for that purpose. Figure 6 shows an example of these kind of spaces. It is a recreational space with a small sauna and pool, which can also be used for team meetings and small lectures.

The second category is prototyping facilities for light and heavy machining, electronics and woodworks for example. An example of this kind of space is shown below in the Figure 7. In this spaces the community members can freely use the machines, devices, and tools for their projects if they have the skills to use them. If they do not, there are usually staff members in the spaces to help.

The third category is open spaces for working and ad-hoc meetings. In these spaces people can come and go to the spaces to work, meet new people or do whatever they will, while the spaces in the first category are private working spaces reserved only on group to guarantee peace of work. Figure 8 shows the café of ADF, “Kafis”, as an example. Kafis is a mixture of an office and café and it is a common place for meeting people, doing private work and cooking together.

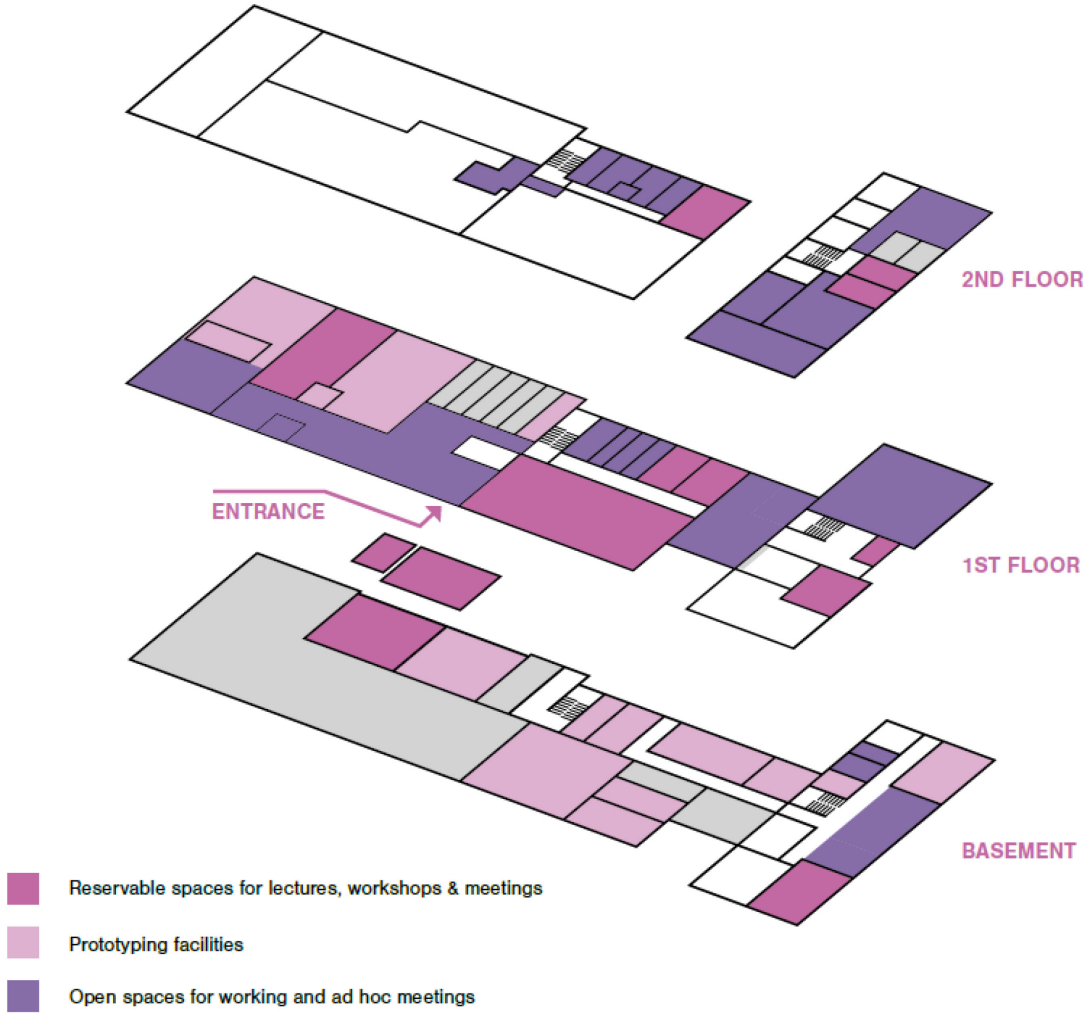

FIGURE 5: LAYOUT OF SPACES OF ADF (TUULOS & SOLOVJEW 2013)

FIGURE 6: COMBINATION OF A LECTURE SPACE, MEETING ROOM AND SAUNA AREA

FIGURE 7: STUDENTS WORKING AT THE MACHINE SHOP

FIGURE 8: "KAFIS" - THE CAFE

3.4 ACTIVITIES OF DESIGN FACTORY

In addition to spaces, the activities of ADF are an essential part of the tour. There are days when the whole building is crowded of people, due to an event or large student course. There are also days when the building is more silent, with only a few staff members wandering around. The experience of the visitors is highly dependent on what happens in the building on that day.

One of the main roles of ADF is to facilitate courses of Aalto University. ADF itself arranges few courses, but it invites course directors to bring their courses to ADF. The courses come from all the disciplines of the Aalto University: business, design, arts, and different fields of technology. The courses are usually related to product design and encourage the students to hands-on work and experimentation, since the spaces of ADF are built for those purposes. The most visible course of ADF is the Product Development Project (PDP) course. It is a nine-month course where students from various

different disciplines work as a team with corporate partners. The corporate partners provide a challenge to the team at the beginning of the course. During the nine months the students research the field; develop ideas; build various prototypes and test them; design concepts; and finally build a functional prototype that answers the challenge provided by the corporate partner. Annually at the PDP course there are approximately 150 students divided into approximately 15 teams, so almost all the time there are PDP students working in the building. PDP course is highly visible to the visitors due to the amount of the students, but also due to the amount of prototypes built and experiments conducted in the building. It is common for a visitor group to get to see building or experimenting happening in the workshops or corridors of ADF. Moreover, the visitors often get to meet the students, since the tour guides usually ask the student team members to explain the visitors about their projects or show their prototypes.

Other major courses at ADF are ME310 course and IDBM Industry Project course. ME310 is arranged by Stanford University and participants of the course come from various universities around the world, including Aalto University. ME310 is similar to PDP course, but ME310 is more intensive and time consuming, and consists only of approximately 20 students annually. IDBM Industry Project is an approximately 60-student course where students work with industrial partners and the final outcome is more business and design oriented. The final outcome often consists of conceptual design, (market) research, prototypes, test results and/or business plan.

In addition to students and their prototypes, during the tours the visitors often get to meet researchers of Aalto University who work in for example product design and education related fields; start-up entrepreneurs; and students doing independent work. One large entity is ADF staff members, whose roles and work vary a lot, and many of the staff members hold multiple roles. Some of the roles are teaching, researching, helping students, building international network around ADF, administration, space development,

design, visualization, and educational development. Sometimes the people at ADF can be met in an informal setting, since the community members tend to spend a lot of free-time together at ADF, for example by cooking, dining, relaxing, and having fun.

One visible activity of ADF is hosting events. Organizations of Aalto University can use the spaces and often the spaces are used for arranging events, like seminars, networking events, exhibitions, and workshops. Moreover, corporations and organizations can rent the space for their events on certain conditions. There are various events every week which gather dozens of people at a time to the lectures halls and corridors of ADF, and it is not uncommon for visitors getting to testify one of them.

3.5 CERN, IDEASQUARE AND DESIGN FACTORY

CERN and ADF started collaboration in 2013, aiming to build ADF-like space to CERN. The spaces was finished in late 2014 and got named 'IdeaSquare'. One of the forms of collaboration was to design the visitor experience of the space. This thesis is part of that design process, aiming to research the learning of the visitors at ADF and transferring the knowledge to CERN. The spaces have many similarities and some differences. Since this thesis studies HOW people learn, instead for example WHAT people learn, the findings of this thesis should be applicable to context of IdeaSquare.

CERN is a laboratory where physicists and engineers are pursuing to find answers to fundamental questions about our universe, like what is the universe made of and how was it born. To find answers to the questions, the physicists and engineers research interaction between different particles, like bosons, simulating the circumstances around the Big Bang, the birth of the universe. For the simulation the scientists use Large Hadron Collider (LHC), the largest particle accelerator in the world (CERN 2014).

To support the research process in CERN the scientists make inventions that have potential to be used outside CERN too. The most common application area is medical industry, but the innovations can end up into everyday use of people too. The scale of the inventions vary, but a famous example of this kind of an invention is the World Wide Web (WWW) which was invented in CERN in 1989 to support the data sharing between the CERN scientists. It got more popular when more user-friendly WWW browsers were introduced in 1993 and since then, the WWW has spread all around the world (CERN 2015, Marson 1997).

IdeaSquare is a project and an innovative space at CERN that is designed to bring together ideas and nurture innovation at CERN. The space has many similarities to ADF, like teaching methods, principles in spatial design, values and activities. The project brings physicists, engineers, industrial partners, early-stage researchers and cross-disciplinary teams of students to work together. The projects are (mostly) related on particle detector upgrade research and development technologies that also have a connection with society. The purpose is to co-develop new technologies and speed up their transfer to the everyday life of the society. IdeaSquare aims to create a fruitful environment for working, sharing ideas, networking and building to create socially and globally relevant new product ideas and innovation (CERN 2015).

The possible forms of activities are for example new technology and product development projects; research exploring and measuring the societal value of basic research; master's and PhD theses related to new technology and product development projects; innovation management; multidisciplinary teamwork; student projects; industry-academia collaboration and knowledge transfer; and creation of European network of innovation platforms.

4 METHODOLOGY

Previous chapter of this thesis provided understanding of what Design Factory is, why does it organize guided tours and what are the expected learning outcomes of the tours. Moreover, the chapter two reviewed what affects learning in an open innovation environment, like Design Factory is.

This chapter aims to give the reader an understanding how the empirical research data of this study was collected through interviews and questionnaires and analyzed with inductive thematic content analysis. Moreover, the participants of the research are introduced.

The chapter five presents the findings from the interviews and the questionnaires in a compact form. The findings were divided into three main categories that represent key factors in reaching the goals of the tour.

4.1 PARTICIPANTS

Most of the research data for this thesis was gathered by interviewing eleven experienced staff members from ADF. In addition, five visitor groups answered a questionnaire about the best parts of their tour. This chapter explains how the data was collected in with the interviews and the questionnaires.

Tour guides

Eleven people with a lot of experience in guiding tours at ADF were chosen for the interviews. The interviewees included employees with 1 to 6 years of work experience at ADF, the emphasis being on more experienced employees with 3 or more years of work experience at ADF. The interviewees estimated that they host tours approximately once per week in average. The interviewees included the director of Design Factory, two designers, two teaching assistants, one manager, one researcher and four coordinators. The interviews lasted from 23 minutes to 80 minutes, averaging 46 minutes. All of the interviews were recorded.

In addition, one CERN tour guide and one remote Design Factory representative were interviewed, but the interviews were disregarded from the results since the context of the interviews turned out to be out the focus of this thesis.

The Table 1 explains the identification codes for different respondents used with the quotations in the chapter 5. The backgrounds of the respondents are not shown in a detailed way to protect their identity. Moreover, the background of the respondent seemed not to be a relevant factor in the interviews.

TABLE 1: THE BACKGROUNDS OF THE INTERVIEW RESPONDENTS

Respondent	Identification
Coordinator	Co1
Coordinator	Co2
Coordinator	Co3
Coordinator	Co4
Coordinator	Co5
Coordinator	Co6
Designer	Des1
Designer	Des2
Researcher	Res
Teaching Assistant	TA1
Teaching Assistant	TA2

Visitors

The questionnaires were conducted to random visitor groups consisting of 6 to 17 visitors. The groups were from different backgrounds: entrepreneurial staff members from a university of applied sciences; students from different countries participating a workshop at ADF; a group of Asian students; a group

of university entrepreneurship society members; and one group with unknown background.

4.2 Data Collection

This chapter will explain how the data collection happened in both interviews and questionnaires.

Interviews

The purpose of the interviews was to find opportunities and problems that the tour guides often face during the tours, so that patterns for enhanced learning could be found.

The interviews were semi-structured, meaning that the interviewer had a list of questions, but some questions were dropped out or modified if the question did not bring any additional value to a particular interview. The questions can be found from Appendix 1. The questions were planned so that the interview would handle the whole visitor experience: from the moment when the visitors contact ADF the first time to the actual visit and the possible contacts after the visit. A visitor journey map (Appendix 3) that illustrated the whole journey from the beginning to the end was used to help the respondent in answering.

The respondents were for example asked about their best and worst experiences of hosting tours; best and worst experience they could wish or imagine; how would they improve the visitor experience; and what is the value of the visits. Some questions were proven to be inefficient, so they were dropped off from the interviews after a couple of interviews.

Questionnaires

Since listening only the tour guides would have brought opinions only from one side, it was decided to gather data from the tour participants too. Therefore, five visitor groups were given a paper questionnaire form that included questions about what did they like during the tour, why did they like

it, what would they like to take to their home organization from ADF, and which of the ADF values were included in their experiences. The results of the last question are not included in this thesis due to their low information value for this thesis. The visitors were asked to fill the form either during the tour or immediately after the tour.

Finding out what the visitors like was expected to help finding out concrete answers to what makes tours successful, which would answer to the second research question: How to enhance the factors that promote the visitor tours of ADF reaching their goals? It was interesting for this thesis to compare whether the answers of the visitors supported the findings from the interviews and if the questionnaires would bring something totally new up.

The questionnaires reached five visitor groups totaling 55 people. The questionnaires produced 152 individual written answers in total. One individual answer includes answers for both "what did you like?" and "why did you like it?" questions.

The surveyed tours happened on time periods when there were less students in the building than normally, which might affect the views of the visitors by for example lack of references to social interactions and showcases, and focusing more on what is all the time available in the Design Factory.

4.3 Data Analysis

Once the data was gathered, the analysis of the data was started. The process of analysis is explained in this chapter, and the research method is illustrated in the Figure 9 at the end of this chapter.

Analysis of open interview data

The interviews were recorded and transcribed. Some of the interviews were held in Finnish: the quotations from these interviews are translations.

First, the transcriptions were read through and divided into units of analysis. A unit of analysis is a description made by the respondent varying from couple of words to several sentences. Each of the descriptions concerns only one subject that has affected or could affect the success of the tour positively or negatively. One respondent produced in average 34,5 positive and 6,6 negative descriptions, totaling 41,2 descriptions in average. Maximum count of total descriptions was 66 and the minimum was 23.

These descriptions were then grouped so that descriptions with similar content with each other were in the same group. All the groups were given a name that answers to the research questions: what are the factors that support and inhibit the guided visitor tours of ADF reaching their goals, and how to promote these factors? For example "visitors discussing with each other". For example if a respondent said "I think that visitors discussing with each other is very important, but also students discussing with visitors is important", the sentence was divided into two units of analysis and placed into two groups called for example "visitors discussing with each other" and "students discussing with the visitors".

After this procedure there were approximately 50 groups, each containing from one to almost 30 descriptions. It was clear that some of the groups needed to be split, some removed and some combined, since groups with too few units are not informative and groups with too many units are too broad for making conclusions.

In assistance of two research professionals (the instructors of this thesis) and after a few iterations the final 14 groups – the categories - were formed. The categories were placed under three main themes, consisting of six, five and three categories.

The three final themes "Social Interaction", "Getting Inspired" and "Tools for Storytelling", were named so that the names answer to the research questions.

The themes are presented separately in the chapter 5 as sub-chapters and the final categories are discussed under the sub-chapters.

Analysis of the semi-structured questionnaire data

The data from the hand-written questionnaire forms was first transferred to MS Excel. The analysis was done in similar manner with interviews: by placing the answers to units of analysis and grouping them. Categorizing, removing, and combining categories of the questionnaire answers was iterated a few times until a few meaningful categories were found.

It was noticed from the answers that when the visitors explain why they liked something during the tour, they reason it from the perspective of a community member or themselves: they were trying to argue how the thing they liked helps community members, or could potentially help the visitor, in their work. For example, to the question 'what did you like during the tour?' a visitor answered: "The teamwork atmosphere established among students and staff" and reasoning why he or she liked it: "Variety of ideas are shared among team members to enrich their learning experience and lead to more quality output". There was similar pattern among almost all of the answers.

The questionnaire findings were categorized basing on this finding. The answers for '**what** did you like during the tour?' represent practices and tools that ADF uses to serve its community. These practices and tools are divided into six categories: Objects, Spaces, Atmosphere, Teaching, Management, and Mindset. These categories represent practices and tools that are most likeable at the tours of ADF, and it helps us to understand the big picture: what the tour consists of, what information is conducted, and which parts/subjects visitors like most.

The factors were again divided into two groups: tangible factors that you can feel or experience (objects, atmosphere, and spaces) and immaterial factors (knowledge or information about teaching methods, management methods, and mindset at ADF). Under these categories there are sub-categories that

are concrete examples of each category. For example under Spaces category it is listed which specific spaces the visitors mentioned. The explanations of the material and immaterial factors are:

Atmosphere of ADF: The visitor liked the atmosphere at Design Factory, or general outlook of the spaces, scents, and sounds.

Objects at ADF: The visitor liked some of the objects in the building. The objects could be for example something permanent installed in the Design Factory like coffee machines, or something less permanent like student prototypes.

Spaces of ADF: The visitor liked the design of a certain space or spaces in general.

Teaching methods used at ADF: The visitor was impressed about teaching methods used at ADF or courses in general.

Ways of management at ADF: The visitor was impressed of the management of Design Factory, including company collaboration, university collaboration and ways of working.

Mindset at ADF: The visitor was impressed of the general mindset among the Design Factory community members, including attitudes and ways of thinking.

The answers for '**why** did you like it?' gives us deeper understanding what kind of impact the practices and tools of ADF have – and more specifically: what kind of impact did the visitors mention they noticed or assumed. This gives us understanding of what are the things that really work at ADF and should be communicated to the visitors. It helps ADF to focus the tours on the most important things and to decide which messages and stories ADF needs to convey to the visitors. Eight categories were formed for the 'why' question: Makes work more efficient, Makes work more fun, Enhances socializing,

Enhances co-working, Inspires users, Inspired the guest, Saves resources, and Makes learning more efficient.

As a concrete example, the 'what' question taught us, that during the tours we need to talk about, for example, how ADF is managed, and support the story by taking the visitors to different spaces. The 'why' question taught us that we need to support these stories about management methods by telling concrete examples how the management methods enhance, for example, socializing. This knowledge helps us answer to the research question.

After the categorization, it was counted how many units of analysis considered each of the categories and sub-categories. This way it was possible to count how many times each of the six "what" categories were liked, and which of the eight "why" categories were the reasons for the like. Moreover, to increase our understanding of the visitors, the reasons for liking tangible factors and immaterial factors were calculated together and separately.

The findings of the questionnaires support the findings of the interviews by providing examples of efficient storytelling tools and knowledge of what kinds of stories should be told during the visit.

The next chapter gives a compact review on the findings of the interviews and questionnaires. Most of the findings are derived from the interviews and part of those findings are supported with results from the questionnaires.

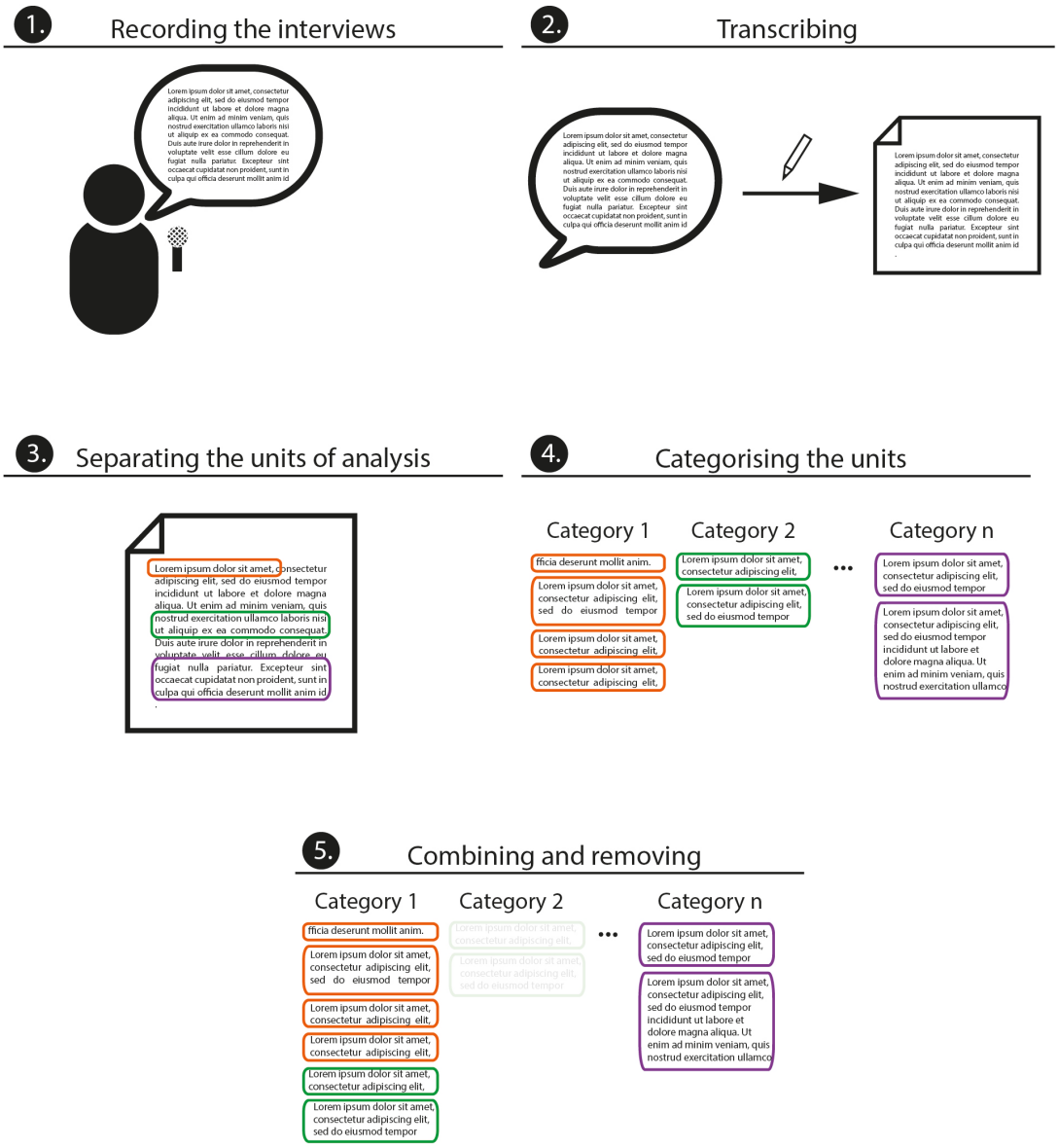

FIGURE 9; THE PROCESS OF DATA COLLECTION AND ANALYSIS

5 RESULTS

The previous chapter explained how the research of this thesis was conducted by interviewing and conducting questionnaires, how the data was analyzed by inductive thematic content analysis, and who took part in the research.

This chapter describes the most important findings from the interviews and the surveys. The findings from the interviews represent the perspectives of the tour guides of what are the factors affecting to the success of the tours, and how to promote the factors that have a positive effect. The findings from the surveys represent the views of the visitors and answer to the same question, although the answers of the questionnaires work mostly as support providing concrete answers and more detailed information about certain interview findings. The data presented and discussed in this chapter is derived from the interviews unless otherwise mentioned.

The data is divided into three main themes that have an effect to the success of the tour which got altogether 311 references from the respondents: "Social Interaction", "Getting Inspired" and "Tools for Storytelling". The amounts of descriptions under each of the categories are shown in the Table 2. Under these themes, different sub-themes, or sub-categories are discussed. The findings are made more concrete by showing quotes from the research respondents.

It is to be noted, that under the sub-chapter the categories are not always presented in order of importance or popularity, but the data is presented in order that guides the reader logically from a subject to another.

TABLE 2: WHAT AFFECTS THE SUCCESS OF THE TOURS?

What affects the success of the tours? (247)
Social Interaction (182)
Tools for Storytelling (83)
Getting inspired (46)

5.1 Social Interaction

Social interaction – meaning mostly discussion - during the tour turned out to be an important factor affecting the success of the tour. The parties participating to the social interaction can be visitors, tour guide, and other community members. The Table 3 shows different themes around discussion: why the discussion is beneficial and how to promote discussion.

Table 3: Amount of descriptions in Social Interaction category

Social Interaction (182)
Value of social interaction (82)
Promoting discussion by preparing the visitors (35)
What can hinder the interaction (29)
Promoting discussion by preparing the tour guide (23)
Who to connect with (9)
Place of discussion (4)

Value of social interaction

Social interaction was regarded to be valuable for the success of the tour since it can enrich the stories of the guide, teach the guide, reduce the workload of the guide, allow exchange of ideas, and allow networking.

The visitors discussing with each other or with the tour guide was mentioned to affect the tours positively by eight respondents 18 times. In addition to discussion within the visitor group, it was preferred to have outside help for discussions, as the quotation below shows. Getting students and staff explaining about their projects to the visitors was regarded valuable 16 times by 9 respondents. Students and staff explaining their work reduces the workload of the tour guide and enriches the stories told during the tour.

> "Well, definitely the face-to-face meetings since there are spaces and prototypes that I tell about, but it is a basic communicational thing that a story doesn't come from a mouth

> of one person, the story… the communication of the place compiles of everybody's stories. Meaning, the stories get much richer, and also I cannot know all the stories… …and also they show the Design Factory spirit that you can talk to anybody, and everybody contribute somehow."Co3

Among other things, discussion was regarded as a sign of the visitors being interested, thus motivating the tour guide as the quotation below shows.

> "Especially when people participate, it motivates a lot and you might end up discussing. Of course when people are interested and you discuss, it is interesting to me." TA2

In addition, the discussion with the visitors during the tour can bring feedback, ideas and thoughts that are useful for the tour guide, other staff members, or students. This was mentioned 13 times by five respondents. It was regarded as a good help for evaluating the work of the students or the tour guide, and as a way for getting feedback for new concepts, for example, as the quotation below shows.

> "Definitely one of the (best) tours are the tours that have some meaning to our students. If the guests have shown interest towards students work or taken part in testing, given some comments and so on. Of course it is also nice when the students get to show their stuff to president or so, they are nice memories." Co5

Networking was regarded the most popular way of the tours being valuable to the ADF community with 35 descriptions by ten respondents. These 35 descriptions included visitors networking with different parties of the community. Connecting visitors with different staff members was mentioned nine times. The tour guides themselves networking with the visitors was

mentioned six times, and visitors connecting with students was mentioned five times. The most popular target for the networking was the ADF as an entity with 12 descriptions. The quotation below demonstrates the importance of networking at the ADF tours.

> "The perfect tour… it would be like… I would know exactly who and how to connect. So as soon as I know that the tour, you know, has some coding experience or want to help, I would know exactly who to contact and how, and when. In perfect world that would be just materialized like 'oh you want to talk to this guy? He's right there'" Co2

Social interaction was mentioned eleven times to teach the host, too. The respondents mentioned six times that by hosting the tours they get to learn new stories about ADF from other community members who talk with the visitors, as the quotation below demonstrates. This was regarded advantageous for learning new stories to be told on oncoming tours, and for staying updated of latest news of ADF. In addition, hosting tours was mentioned two times to enhance the skills of explaining complex ideas (pitching skills), and two times it was mentioned that the social interaction can bring knowledge from visitors to the host.

> "(I'm motivated to host tours) because you get to know DeFa yourself, and kind of learn stories about what has happened here, and in a way got to know the house better." TA1

Who to connect with

The respondents also described that there are certain profiles of people they wish to connect during the tours. Most commonly (five descriptions) the tour guides mentioned they wish to connect with people from a specific industrial or academic field or from a specific company. An example of this is shown on the quotation below. Moreover, networking with people from a specific

country was mentioned two times. Likewise, networking with important people – people with high status, like presidents – was mentioned two times.

> ” …and quite often if you hear that some specific interesting group is coming, I may try to get myself to host the group to see what kinds of people they are… …Then, different thing is if there is some specific tech company visiting, like Google or KUKA, or other bad-ass robotics firm from anywhere, then I’m always interested and naturally have a lot to ask from them, and I understand what they are doing so I think it is easier to explain things to them." TA2

In addition, four respondents mentioned eight times that it would be a good idea to have some kind of a way to match the interests of the tour guide to the interests of the visitors, like the example below shows.

> “I would be more motivated to pick random tours if I knew they have mentioned that they are interested in teaching. Then I would know that they at least stay awake throughout the tour.” Res

Place of discussion

To facilitate the discussions there is a need to have a proper stopping places during the tour as the quotation below shows. This was mentioned four times by three respondents. The café of ADF – “Kafis” – was mentioned by two of the respondents. An example of such quotation can be seen below. Other commonly mentioned places were different workshops. Qualities of a stopping place promoting discussion are spaces with enough of room for gathering up, places with enough of people to discuss with, and places with enough of objects to stimulate the visitors.

> "During the tour – not in the beginning or the end - it's good to have a moment to take a break and chat a bit. Kafis works well on this. People start discussing a lot. Usually about building their own spaces." Des2

Promoting discussion by preparing the visitors

Preparing the visitors for the visit was mentioned to affect the tour positively 35 times by nine respondents. The 35 descriptions were divided into three categories: staff preparing the visitors before the arrival (19 descriptions), staff preparing the visitors at the beginning of the tour (16 descriptions) and the visitors preparing themselves (eight descriptions).

Creating right mindset, or in other words, making upcoming visitors understand Design Factory better before they arrive was regarded an important factor for enhancing the discussion, as the quotation below shows. It was mentioned to affect the tour positively 19 times by seven respondents. The tour guides described that since the visitors came to the building with little preliminary knowledge about basic facts of DF and what to expect, the flood of information was too high which caused the visitors to ask too shallow questions or no questions at all. The issue was mentioned altogether 19 times by seven tour guides. Out of this 19 descriptions eight described that the visitors should know better what to expect and six described that the visitors should know more basic facts of ADF before the visit.

> "Perhaps if they are coming here already with some idea of what Design Factory is, they would profit a bit more instead of coming from zero I-don't-know-anything. It's OK if they do, then, you know we can explain them but when they already kind of have an idea, they have been thinking about it, they might be thinking of something very… they might be thinking of

> something very specific… of what to get… what they want to get from Design Factory and vice versa." Co1

In addition to preparing the visitors before the tour, it was regarded important to prepare them at the beginning of the tour when the visitors and the tour guide meet. The preparations were described to give an overall picture about what ADF is and what are the activities. The preparations would make sure that all the visitors will learn the most important things of DF before the actual tour starts, which would also make sure the visitors would be able to talk about more concrete subjects during the tour, as the quotation below demonstrates.

> "By showing ongoing projects in the beginning of the tour we could prepare the important visitors better. It might also help realizing the big picture at the end, and help the visitors to ask or suggest more concrete things basing on the tour" Co6

In addition to Design Factory staff preparing the visitors for the visit, five of the respondents mentioned eight times that it is important for the visitors to make some effort to get prepared for the visit. The role of the group host was highlighted; the host should make sure that all the visitors know what to expect. The more common notion was that the visitors should have a clear agenda for the visit, like the quotation below shows.

> "Ken (the visitor) had a clear agenda there, he had got a recommendation to come here. We knew what to tell him, it worked very well which was nice." Co6

Promoting discussion by preparing the tour guide

It was found out that it would be helpful to gather more information about the visitors before the visit so that the tour guide could get prepared. In

addition, it would help tour guides to choose the most interesting and valuable visitor groups. This was mentioned 23 times by seven respondents. The respondents wished to have information of what the visitors are interested in (nine descriptions), the academic or industrial background of the visitors (five descriptions), the purpose of the visit (three descriptions), and the expectations of the visitors (two descriptions).

Gathering information about oncoming visitors was often regarded as a tool for making the tours more useful for the community. It could help for example avoiding tours that are waste of time, or helping to concentrate to the tours that have potential for collaboration. Five interviewees mentioned that getting background information from the visitors would help them to find the most useful tours.

Gathering the interests of the visitors was often regarded as a help for customizing the tours according to the interests of the guests, as the description below shows. By customizing the tour, the host can focus on the most important subjects and talk about them deeply. This would encourage the guests to ask more questions or to be active in other ways.

> "Surprisingly seldom people ask anything specific, since they are usually interested in the concept (of Design Factory) in general, but the better you can target the tour personally to the guests' interests, the better the tour is." Co6

Knowing the academic or industrial backgrounds of the visitors would also motivate the tour guides to give tours to groups from a specific industry or field.

What can hinder the social interaction?

A common theme affecting the tour negatively is communication problems, which was mentioned 29 times by ten interviewees. The biggest factors causing problems for communication is too short time for the tour (13

descriptions), since that leaves too little time for discussion. Moreover, too large group size was regarded to hinder the communication (9 descriptions) since it is hard to make larger groups to pay attention. An example of how too large group size can hinder communication can be found below. Language barrier – meaning the lower ability of the visitors understanding English - was mentioned six times to hinder the communication during the tours. Visitors being late was mentioned once.

> "Dialogue and ease of understandability… for that the group size should be 6 people maximum. If the group size is bigger, it gets more like common chit-chat and you get discussion with only couple of people" Des2

5.2 Tools for Storytelling

Popular factors affecting the informativeness of the tours were different aids and practices that help people understand what the tour guide is saying: tools for storytelling. According to the respondents, efficient tools for storytelling were objects, showcases, spaces, sources of information for the tour guide, action around the building, and hands-on participation of the visitors. These tools helping to reach the goals of the visits were mentioned 83 times by ten respondents. The amount of descriptions per tool is shown in the Table 4.

Table 4: Tools for Storytelling

Tools for storytelling (83)
Objects & showcases (29)
Action around the building (20)
Availability of information (19)
Hands-on participation (13)
Spaces (12)

The questionnaire answers for '**what** did you like during the tour?' represent practices and tools that ADF uses to serve its community. These practices and tools are divided into six categories: Objects, Spaces and Atmosphere representing tangible factors, and Teaching methods, Ways of management, and Mindset of at ADF representing immaterial factors. The division to tangible and immaterial factors was meaningful since it is important to know which physical factors affect the learning of the visitors and which immaterial factors, like knowledge and stories, affect the learning. These categories represent practices and tools that are most likeable at the tours of ADF, and it helps us to understand the big picture: what the tour consists of, what information is conducted, and which parts/subjects visitors like most. The tangible and immaterial factors are discussed later in this chapter.

The '**why** did you like it?' part was divided into categories which represent different reasons why the visitors liked certain things. The categories help us understand what qualities, goals and results of ADF the visitors liked most, in general during the tour, but also in more detail, investigating only one tangible or immaterial factor. The categories for the 'why' question are It inspired the visitor, It enhances co-working, It makes work more fun, It inspires the community, It enhances socializing, It makes working more efficient, It saves resources, and It makes learning more efficient. The amounts of references can be seen in the Table 5.

TABLE 5: REASONS FOR THE LIKES OF THE VISITORS

Questionnaire results: reasons for the likes of the visitors (146)
It inspired the visitor (46)
It enhances co-working (27)
It makes work more fun (18)
It inspires the community (16)
It enhances socializing (12)
It makes working more efficient (11)

It saves resources (9)
It makes learning more efficient (7)

What kind of information and stories are interesting to the visitors

The immaterial factors got 46 references out of 161 total references to the 'what did you like' question, which calculates to 29%, against 71% of tangible factors. There were three themes, shown in the Table 6, of the immaterial factors that the visitors liked most. The management methods of ADF were mentioned 18 times. This included visitors liking, for example the university relationships (six references), company relationships (three references), and courses (three references) of ADF. The visitors liked the information about ways of management since it inspired the visitor and enhances co-working.

The visitors wrote that they liked something about the mindset at ADF 17 times. Most referenced aspects of the mindset are the communal attitude at ADF (six references), openness to new things and people (three references), and lack of rules and bureaucracy (three references). Mindset was regarded to enhance co-working, to make work more fun, enhance socializing, and inspire the visitors.

TABLE 6: IMMATERIAL FACTORS THAT THE VISITORS LIKED

Questionnaire results: which immaterial factors the visitors liked during the tour (46)
Ways of management (18)
Mindset at ADF (17)
Teaching methods (11)

The teaching methods used at ADF were liked eleven times. On this sub-category practical courses (five references) and teamwork (three references) were highlighted. The reasons for liking were mostly that the visitor got inspired and that it makes learning more efficient.

All in all, according to the questionnaires, the visitors were most interested in stories and information about university relationships (six descriptions), company relationships (three descriptions), the community (six descriptions), how ADF boosts creativity (six descriptions), how ADF promotes practicality (five descriptions), courses (three descriptions), openness of ADF (three descriptions) and freedom (lack of bureaucracy and limitations) (three descriptions).

Objects

Objects were mentioned to be efficient ways of telling stories about for example ways of working, events and courses of Design Factory, like the quotation below shows. Objects support the stories by giving the audience more concrete idea of what the host is talking about. Moreover, objects work as a support for memory of the tour guide and stimulus for the visitors, encouraging them to ask more questions.

> ”Like Kafis for example, it’s easy... It's frustrating to stand in the Stage, in an empty room and explain ‘Here the innovation happens!’ In kafis it’s kind of easy to say that ‘interaction, the hugging points enhance that, this is our operating culture, this face wall is here because…’ maybe I would wish same kind of stuff to the other spaces too. So that it wouldn’t be only like ‘here you can have a lecture or do something else’ but there would be more examples visible of what has been done here.” Res

The Table 7 shows the division of the answers of the visitors. It can be seen that the visitors mostly liked the spaces, with 67 references, but objects were the second most liked factors from all the tangible and immaterial factors, with 35 references. The quotation below shows an example of a visitor who liked an object, and a reason for liking that object. Out of all the categories of the ‘why’ question, the objects were mentioned mostly to inspire the visitors, although the quotation below shows how an object can enhance collaboration.

What: "The idea board in the hall way" Why: "Creating with other, not binding to time."

TABLE 7: TANGIBLE FACTORS THAT THE VISITORS LIKED

Questionnaire results: which tangible factors the visitors liked during the tour (115)
Spaces of ADF (67)
Objects at ADF (35)
Atmosphere at ADF (13)

The amounts of likes that different objects got were counted from the questionnaire answers, and the interview descriptions of objects that support storytelling best were counted. From this, we got an understanding what kinds of objects support the tours best. The ¨Hugging Point' (introduced in the chapter 3) was mentioned most commonly: 12 times by visitors and four times by hosts. Prototypes around the building – mostly prototypes that are functional, look otherwise like real products, or are displayed in an unusual place, like hanging from roof - were mentioned several times by both visitors and the tour guides.

Action around the building

People doing their work around Design Factory was regarded a great help in making the tour experience better, as the quote below shows. Instead of explaining to the visitors what kinds of activities happen in the building, it was regarded more valuable if the visitors could themselves see the activities. The tour guides mentioned that having students working, building activities (like construction work or students building prototypes), lots of people in the building, or an event going on in the building makes it easier to conduct information to the visitor group. Moreover, when the building is full of people, it is easier to find community members to talk with the visitors.

> "Ken, when the seed for Swinburne was planted. There were 200 TaiK students doing some workshops. There were literally 300 people in the building. They were also building Kafis, they were drilling hole on the floor. It was the end of Venture Garage, there was VG demo day… …It was like being in Santa's workshop one week before Christmas." Des1

Availability of information

Eight tour guides described 14 times that they wished to have more help for guiding the tours. The most wanted help was a tool for getting more information – a story bank for staff - with six descriptions from five respondents. The quotation below shows an example of this. The respondents described they would wish there was some kind of a collection of the best stories happened at the Design Factory so that they could read and learn them and then tell them forward. Three respondents said that information placed visually around the building, for example about ongoing projects, would make it easier to teach the visitors. It would help the tour guides to improvise during the tour by getting more information from a poster for example. In addition, it would help the visitors understand what the tour guide is saying. Two interviewees explained that running a tour with two hosts makes the hosting experience better, since then they have someone to back them up with stories they do not know.

> "I think maybe the… it could be if those stories would be stored somewhere, like the most important and interesting facts that are often asked, if they would be in some kind of inner wiki where you could check that…" TA2

Hands-on participation

Making visitors do something for the project teams, like testing a prototype, was mentioned helpful 13 times by eight respondents. Mostly the comments were about improving the visitor experience so that the visitors could do more during the tours, instead of just listening, watching and talking. The "doing" was mostly considered to make the tour more memorable and to add some variance to the tour.

> "We could somehow develop some kind of phase or element where the guest has to do something. It could be, a boring example: be filling up a form, choosing a post card that best describes your feelings at the moment. Some kind of testing thing. Does not have to be related to anything that's ongoing. Example: when we had Planmeca's head shaking measurement thing here... You could take part in something. And in home you could say that 'do you know what happens when you try to keep your head still'…" Co5

Spaces

Spaces were mentioned to be efficient tools for storytelling by seven respondents altogether 12 times. The spaces were said to communicate the purpose of ADF better than just a spoken story, since the spaces have objects that make the stories more concrete and convincing. Moreover, in some of the spaces it is easy to find staff members or students to explain stories about their work or how they use the space. Some specific spaces were mentioned in the interviews to be helpful: Kafis (the café, four descriptions), different workshops, like Machine Shop (three descriptions), a space with a large knitting machine (two descriptions), and a meeting room with special chairs (one description).

According to the questionnaires, the visitors liked most Kafis (16 references), workshops (13 references), the sea containers, which are used for building spaces cost-efficiently (13 references), and social points (4 references).

Kafis, with four descriptions, turned out to be an efficient space to demonstrate how Design Factory enhances interaction by bringing people together, as a respondent describes it below. Moreover, stories about objects located in Kafis like coffee machines, hugging points and face wall (which is a wall full of pictures and information about community members) make it a functional space for storytelling.

> "And then in Kafis the thing that you get to see other people and it is kind of a place where you get to see in most concrete way how we enhance interaction, like 'we use this kinds of tricks to do it'. It is the most concrete example of our operating culture and how we support it with spaces. Quite often the visitors are interested in spaces, they come here mostly because of that, not much depending on their agenda…" Res

The second most popular space for storytelling, with three quotations, was Machine Shop, which was mostly used for demonstrating how the prototyping activities work at Design Factory. The machines in the space help tour guides to demonstrate what tools the students can use in a concrete way, and the stories told by Machine Shop staff members add value to the stories told by the hosts.

5.3 Getting Inspired

Getting the visitors inspired during the tour was mentioned important for achieving a successful tour by all of the eleven respondents 77 times. In this thesis, inspiration of the visitors is defined visitors being interested, excited or active and the division of these is shown in the Table 8. Importance of visitors being interested was mentioned 23 times while visitors being excited was mentioned 12 times and visitors being active eleven times. Mostly the

inspiration of visitors was regarded to bring energy and motivation to the tour guide, like the quotation below shows.

> "Very passive guests are difficult, it's hard to be energetic and excited if they are passive" Co3

TABLE 8: SIGNS OF INSPIRATION

Signs of visitor being inspired (46)
Visitor is interested (23)
Visitor is excited (12)
Visitor is active (11)

In addition, five respondents mentioned that it is a good sign that the tour has been prolonged because the cause for the prolonged tour time is usually high level of activity of the visitors.

Spaces and objects turned out to be a major reasons for the visitors getting inspired during the tours with 12 descriptions from five respondents. In addition to the general milieu of the Design Factory, two specific spaces got mentions too: Kafis (the café) and the Engine Room which is a meeting room with rolling and comfortable chairs with tables attached in them. An example how the Engine Room inspires the guests is shown below.

> "And then you say like… make a small joke saying 'this is our amusement park section, here are the bumper cars' and there I often advice… I ask them to sit down. And people usually try them and start spinning in the chairs. It often creates playful mood." Co3

In contrast to inspired visitors, one of the most common factors lowering the quality of the tour was uninspired visitors. This factor was mentioned 14 times by nine respondents. The most commonly mentioned characteristic of

an uninspired visitor was unpleasantness of the visitor with seven references. Second characteristic is a group that has many destinations to visit and Design Factory is just one of them (four descriptions) as the quotation below demonstrates. The third one is when the group is "forced" to be on the tour, for example a school group.

> "Groups that come here as a part of bigger tour of many places, they are not always interested." Res

6 DISCUSSION

This thesis shows that visitors interacting with community members, each other, and the tour guide is one of the key factors for a successful tour at an open innovation environment. Different ways to support social interaction and other success factors are preparing the tour well, communicating to the visitors before the visit, and different tools for storytelling, like objects, spaces, and other people.

Social interaction - visitors discussing, interacting and collaborating with each other - shapes and influences the visitor experience and enhances the learning of the visitors. It is regarded as a way to share and receive academic and social support, and as a way to communicate and reflect with the visitor group. It is not always regarded as a way of transferring information from visitor to visitor, but more as a way of creating circumstances for people to experience the exhibition together and in different ways. Moreover, it is a way for potential learning: to have experiences together to store information for later discussions inside families (Borun & Chambers 1996, Hindmarsh, et al. 2005) - and why not other communities that spend a lot of time together and share common values?

While the literature shows social interaction is important for the learning of the visitors, the empirical research of this thesis found out that the tour guides of ADF find social interaction – visitors interacting with each other, the tour guide and the ADF community - highly valuable too. Since the tour guides have a limited amount of stories to tell during the tour, the tour guides appreciate other community members telling their stories. This was regarded as an enrichment to the tour and reducing the workload of the tour guide. Interaction between visitors and community members can have other advantages too. According to a research, stories about people are efficient ways of helping interpretation since the audience can relate the information to their own experiences (Lorenc, et al. 2007). Moreover, visitor group

members interacting with each other and the community was regarded as a sign of interest, which motivates the tour guide.

Networking with people from interesting academic fields or industries was regarded as a significant advantage that the social interaction delivers. Discussion between the visitors and the tour guide or other community members was regarded to create valuable connections between different parties. Moreover, social interaction was regarded to bring valuable ideas, feedback and thoughts to the community.

Getting the visitors inspired turned out to be good means to promote discussion and make the tour successful in general. Making the visitors inspired - interested, excited or active - was regarded to bring motivation to the tour guide and enhance the discussion. How to get them inspired is an important question, and we have got some clues for that: for example by showing interesting objects and spaces.

The tour guides require **support for storytelling**. The empirical research revealed a few factors that make storytelling easier for the tours guide. These factors are objects, showcases, spaces, sources of information, action around the building and hands-on participation of the visitors. From the visitors we learned that the visitors are most interested in knowledge of how ADF supports co-working, inspiration, socializing, efficiency of work, efficiency of learning, and saving resources. These aspects can be highlighted by telling about university relationships, company relationships, the community, how the creativity of the community is enhanced, how practical work is promoted, courses, openness, and lack of bureaucracy and limitations.

The tour guides appreciated the tangible tools and wished for more immaterial tools for storytelling. They wished to have tools that helps them know or remember more basic facts and stories about ADF. For example ADF stories and facts collected somewhere would help the tour guides to study before hosting tours. In addition, the respondents wished that some of the

facts and stories would be located around the building so that they could see them while hosting the tour. From

One way to support the storytelling is the **personal development** of the tour guide, which was also noticed in the literature review. Many of the tour guides mentioned that by hosting tours, or participating to a tour hosted by someone else, the hosts can learn new stories about ADF. In addition, other skills learned during tours were mentioned, like skills to explain complex ideas.

From the tangible tools **objects** – for example prototypes of the students or production machines – are efficient ways of telling stories about the activities of ADF. They give a concrete and convincing example of what the tour guide is talking about, they stimulate the visitors to ask more questions and they work as support for the memory of the tour guide. According to theory, objects help the visitors to interpret the story in their own way by reflecting the object to their own experience with similar objects (Macdonald 2007.) Still, it must be remembered to avoid having too many objects in the space to keep the cognitive load of the visitors low enough (Wittlin 1971.)

Spaces are great tools for storytelling partly from similar reasons with objects: they give a concrete example of the activities of ADF. In addition, usually staff members and students can be found from the spaces to tell about their work to the visitor group. The circumstances are best for the tour guide when the building is full of students and other people working on their projects. Moreover, spaces with a lot of room around create good environment for discussion.

Moreover, spaces with enough of objects or other stimulation for discussion or enough of room were mentioned to promote discussion and general activity of the visitors. In addition, spatial design can promote discussion for example by creating spaces so that the visitors are "forced" to be next to each other, for example by placing benches of two around the space (Feher 1990.) In general, the tour should be rather provocative than instructional, encouraging the

visitors to ask questions. This will lead to more effective interpretation of the story (Lorenc, et al. 2007).

The tour guides mentioned many times the importance of the visitors **participating by doing** something with their hands, like building or testing prototypes of the students. Nevertheless, this hands-on action had not actually happened often enough, but the tour guides assumed it would promote the success of the tour and hoped for more hands-on action. This assumption is supported by literature: learning by doing is an efficient way for learning. It is not always thought as a fool-proof learning method by itself, but hands-on action makes people think, which leads to better learning results (Cremin 1961, Duckworth 1990, Falk, et al. 2004.) Moreover, hands-on action promotes doing things together, communication and talking which is promotional for learning. Interacting with exhibit objects makes people make connections to objects familiar from everyday life, thus making it easier to understand concepts (Falk, et al. 2004, Heath, et al. 2005).

Interacting with objects naturally stimulates many of our **senses**. According to many studies, for example Gardner 1997, Pritchard 2009, and Shams & Seitz 2008, using more senses during learning makes people learn more efficiently. In addition, stimulating the intelligence and emotions by providing sufficient amount of mental challenge to the visitors enhances their learning (Csíkszentmihály 1995.)

Preparations can promote discussion significantly. Preparing tour guides, for example by making them familiar about the backgrounds of their visitors, can help them customize the tour according to the interests of their visitors. This was regarded to promote discussion during the tours. In addition, some kind of a system for matching the interests of the tour guides and the visitors was hoped, since it was believed that this would make the tour more fruitful for both visitors and the tour guide. Knowing what the visitors already know and do not know is important for the tour guide and the people who design the tours, since prior knowledge determines how a learner handles new

information. The visitors need to associate the educational situation with what they already know (Csíkszentmihály 1995, Roschelle 1995).

In addition to preparing the tour guide, preparing the visitors before the visit and at the beginning of the tour was regarded advantageous. Preparing the visitors well, by for example telling them the basic facts of ADF, increases their ability to ask more questions and deeper questions. Studies also suggests to give visitors preliminary material before the visit, since it enhances their learning (Koran & Koran 1996, Csíkszentmihály 1995.)

Personal mobile devices can promote discussion and other interaction during the tour – and also after the tour. Different services of social media provides way to share the experience and give feedback after the tour, (Carter 2006, Leask, et al. 2014) and these opportunities should be noticed by the tour designers.

6.1 Limitations

The data of this research comes from eleven interviews of tour guides and 55 questionnaire answers written by the visitors. Since the questionnaire was intended to be short and not time consuming, the results of the questionnaire are shallow, but still valuable. Moreover, the questionnaires were conducted mostly when there was not many people in the building of ADF, making the tours less interactive. This means that this thesis focuses more on the points of views of the tour guides, while the point of view of the visitors is supportive. In addition, the empirical research focuses only on one space, ADF.

6.2 Theoretical Implications

On the future studies, it is recommended to research the visitors more closely: to find out how they learn best and perhaps what keeps them from interacting and what encourages them to interact. Moreover, it is recommended to conduct more research on corporate exhibitions and similar environments for learning, since that area of research is widely neglected, though highly

important for understanding the visitor experience of open innovation spaces. Moreover, corporations could benefit if they had more knowledge how to promote their company in corporate exhibitions.

6.3 Practical Implications

For Design Factory, IdeaSquare, other open innovation environments, and basically any corporation who have intentions to host visitors and make them learn about the organization, a few design guidelines are given here for optimal learning experience.

Collect a database of things you want to tell to the visitors, the best stories to tell (according to tour guides and visitors), techniques for storytelling, and detailed knowledge about the organization, for example. Use this database, first, to design the storyline of the tour, and second, make it easily available for the tour guides so that they can study the database and become better tour guides. Place the data around the building to support the memory of the tour guide.

Get to know the visitors before they arrive – and make them familiar with you. When the visitors know where they are going, what they are going to experience, and the basic facts of the industry, they will be more ready to discuss and ask questions. When you know who are coming, it is easier for you to customize the tour and get the full value out of the visitors. Moreover, design the visitor experience so that it caters as many different people as possible: there are various different styles of learning and intelligences. Can you predict which learning styles and intelligences are present in your visitor group?

During the tour, tell stories – of success or failure - about the people in the organization, possibly with some spicing. Use metaphors to make people related and understand your message. Support the storytelling during the tour by displaying objects, preferably high quality prototypes or products

created in the organization, and preferably in an attractive and unique way. Allow interaction with objects and provide chances to use intelligence and senses, in form of challenges, perhaps. Make the interactives so that they can be used in groups, since that enhances social interaction, thus enhances learning. Design the spaces in general so that the people are "forced" to interact with each other and the community members. Moreover, plan "coincidental" meetings: try to coordinate so that the visitors meet as much as possible community members, and prepare the community members to tell their stories. This is good for the host, the visitors, and the community members, since talking with visitors is a great opportunity for networking, sharing ideas, and learning.

6.4 Conclusion

As a conclusion, we can say that inviting visitors to learn to an open innovation environment is like inviting guests to have dinner in your house. First, you send an invitation with a brief agenda for the evening. You also ask the guests about special diets, preferences between white and red wine, and chicken and beef. You want to cater all the different taste buds. While waiting for the guests you cook the food, prepare the table, and think of a couple stories to tell. When the guests arrive, you might want to give a few welcome words and have a welcome cocktail. During the evening you are not the one who is all the time talking – you aim to facilitate the discussion between the guests. If it seems that the discussion is not as smooth as you would want, you might want to show the house or grandpa's old hunting rifle – or have a bit more of red wine. This will sure make the guests inspired. When it is time to leave, you might want to share contacts with the visitors you had not shared them before with. Before leaving it is good to take a photo together – perhaps a self-portrait – and share it with friends.

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APPENDICES

APPENDIX 1 (1/2): Interview Questions

BACKGROUND QUESTIONS

How often do you give tours at DF?

How do you end up giving tour?

MOTIVATIONS FOR GIVING TOURS

What motivates you to give a tour?

What is unmotivating in giving tours? What could be done to make this better?

Why do we give tours? Do you think it's important to give tours? Why/why not?

TOUR ARRANGEMENTS

In an ideal world, how could visitors be useful for DF?

Does giving tours support your work or personal interests? How? What could be done to make it better?

Do the visitors ever ask or need something before the visit? What?

What are the most common problems you face during the tours?

What are the most common questions during the tour?

What are the things at DF that gain most attention?

Can you think of your best experience(s) of giving tours?

Can you think of your worst experience(s) of giving tours?

APPENDIX 1 (2/2): Interview Questions

In an ideal world, describe the best possible visit.

What kind of support would you need to make the visits more educational and enjoyable for the visitors or you?

What do the visitors need/ask at the end of the tour?

Have the visitors contacted you or someone else after the tour? What they wanted?

Can you still think what could we do to make the visitor system better?

APPENDIX 2: The questionnaire form

DESIGN FACTORY TOUR TAKEAWAYS

During the tour, fill in the best things of the tour. It can be people, rooms, stories... anything.

This was cool:

Why was it cool?

That was
- ☐ Mad
- ☐ Inspiring
- ☐ Warm
- ☐ Hands-on
- ☐ Proactive
- ☐ Rich
- ☐ Empowering
- ☐ Co-creational

This was cool:

Why was it cool?

That was
- ☐ Mad
- ☐ Inspiring
- ☐ Warm
- ☐ Hands-on
- ☐ Proactive
- ☐ Rich
- ☐ Empowering
- ☐ Co-creational

This was cool:

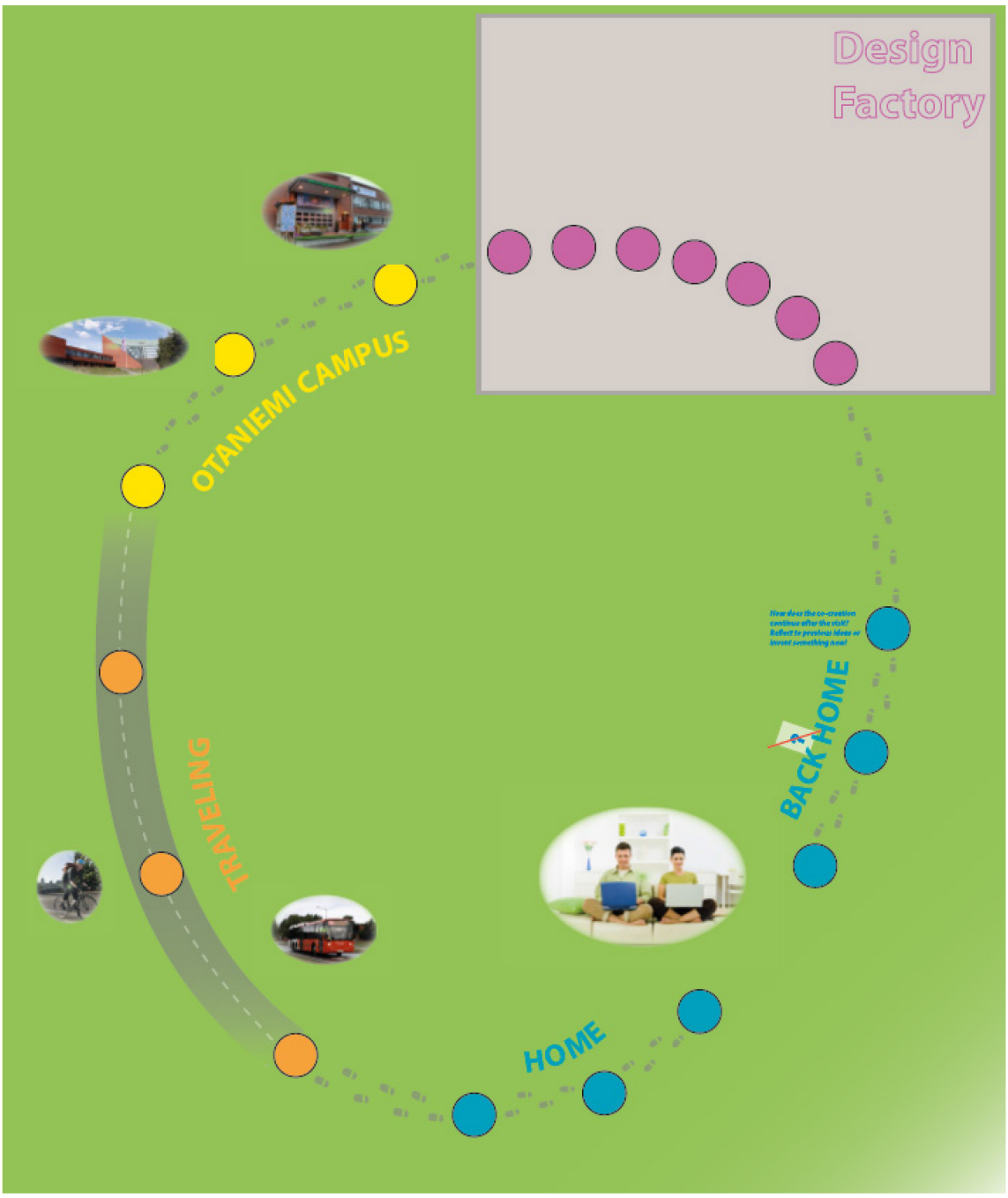
Why was it cool?

That was
- ☐ Mad
- ☐ Inspiring
- ☐ Warm
- ☐ Hands-on
- ☐ Proactive
- ☐ Rich
- ☐ Empowering
- ☐ Co-creational

How could you bring these experiences to your home base (university, office, home, hobby...)? Write or draw!

Aalto University
Design Factory

APPENDIX 3: The visitor journey map



APPENDIX 4 (1/2): A day at ADF

Process in product development is focusing on practice-based learning, learning from mistakes, testing and iterating. The work is intensive and the different tasks require different environments – sometimes messy, which feeds the creative mind, and sometimes clean and well organized in order to finalize and fine-tune.

A creative way to utilize different spaces was seen at ADF in the ME310 course. Due to the hectic nature of this course, the students need a home base, a place where they can work intensively on their projects, build and develop ideas 24/7. Aalto Design Factory served as a second home during the intricate product development process – the students got advice, mentoring and instructions from the teaching staff and they were active in using ADF's facilities supporting the different phases of the process.

During the intensive product development year the students go through a complete process from creating ideas, testing, prototyping, building robots, organizing SUDS (Slightly Unorganized Design Sessions) to developing concepts. The Dark Horse Challenge is one of the prototyping challenges given to the teams in the middle of the year. With that challenge, the teams are instructed to prototype their wildest ideas and test them with users. The Dark Horse Prototype is not likely to be a "winner" in the sense that it would be developed further to the final concept but it usually brings many valuable insights for the project.

Here is an example of the journey of one of the teams tackling the Dark Horse Challenge:

- Ideation in Fatboy Lounge since it is a quite inspiring and comfortable room, which works well for brainstorming. Building the first prototype Puuhabunkkeri because it is a good place for quick & dirty prototyping in MacGyver style; out of cardboard and duct tape.

APPENDIX 4 (2/2): A day at ADF

- Testing the prototype with users in Kafis, especially on Tuesday morning during Breakfast at DFfany's, since it is a great opportunity to get feedback from people who come from different backgrounds.
- Iterating the prototype in Puuhabunkkeri, which is the perfect place for fine tuning and getting feedback from other students.
- Testing again in the Lobby to meet random visitors who might have a different perspective than regular ADF community members.
- Building a higher resolution prototype based on observations and tests results in Machine Shop and Electroshop with the help of the Service team.
- Taking a break from the challenge and getting feedback from the ME310 community by organizing a SUDS in the Backyard Pool with its sauna and relaxed atmosphere.

Maud Bocquillod

ME310 Teaching Assistant

(Tuulos & Solovjew, 2013)